THE ENGINEERING AND MINING JOURNAL

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVI. No. 16.

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SUBSCRIPTION PRICE, including postage, for the United States and Canada, $4 per annum ; $2.25 for six months ; all other countries, including postage, $5.00 = 20s. = 25 francs = 20 marks. All payments must be made in advance.

FILE COVERS will be sent by mail for $1.25 or delivered at office for $1 each.

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THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,

P.O. Box 1833. 27 Park Place, New York.

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EMIL WOHLERS, a prominent German engineer, and a member of the firm of NATHAN & DREYFUS of this city, died recently in Vienna, when on a visit. He was the representative of the Friedman injector, and introduced it here.

THE Ontario Silver Mining Company has recommenced making dividends. These have now amounted to five million dollars. A splendid record and testimonial to the honesty and intelligence of the company's management.

UNDER "MINING NEWS," in our issue of September 29th, we made favorable mention of the New York Mining and Milling Company's property in Colorado. We have since received information from very reliable and well-informed sources which is very unfavorable to the enterprise. We feel it our duty to the public who may be disposed to invest in this concern to state that there is at least such a difference of opinion as to the value of these mines as should induce prudent capitalists to desire fuller information from disinterested sources as to their value before investing.

WE referred in a recent issue to the proposal made by POETSCH, in Germany, to facilitate sinking through quicksand by freezing the ground. More complete details are now available through a communication by Professor G. KOEHLER, of the Clausthal School of Mines. The enormous difficulty encountered in many important works, in mining as well as in railroad tunneling, notably on the continent, are well known to engineers, by whom quicksand is more dreaded as a source of very heavy expense and delay than the hardest and toughest rock. The Poetsch method will, we are convinced, take rank among the best means of getting through such ground; and however absurd the method may appear at first sight, it has in it the elements of considerable value under special circumstances. After he has reached the quicksand in the ordinary way, he puts down a number of holes, three feet apart in a circle, through the layers of quicksand, at such an angle that they reach into the ground through which the shaft must pass. Further, a smaller circle of holes is put down in the bottom of the shaft and one in its center. All of the holes are sunk by means of a sand-pump, being tubed as they go down. A circular distributing-pipe is suspended above the bottom of the shaft, copper tubes provided with cocks connecting with each of the holes and descending in them to their bottom. Though these copper tubes he pumps into the holes a solution of calcium and magnesium chlorides reduced at a temperature of 25 degrees Celsius below zero. The solution flows to the bottom of the holes and ascends in them in the annular space, being gathered as it reaches the top of the holes by a collecting-pipe. It took from 10 to 14 days to freeze a deposit of 12 feet of quicksand into a solid mass of ice through which sinking may go on without any danger of accidents from water.

SOMEWHAT prematurely, to say the least, some people in the lead trade are beginning to protest that mining argentiferous lead ores will soon become or now threatens to become an unprofitable business, because the prices of lead are falling. On a declining market, this cry is generally raised, and our experience has been, that the pressure of necessity creates efforts at economy which have a wonderfully scaling effect upon the cost of production. It is at a time like the present that there is a fruitful crop of estimates, which, as they come from those who would like to stay the downward tendency of prices, do injustice to the mines. As an example, we quote the following from a letter written by Messrs. J. H. ACKERMAN, metal merchants of this city, to the *Iron Age*, in which they protest against the statement that the Pueblo Smelting and Refining Company was understood to have on hand 7000 tons of lead :

"To mine 10 tons of lead ores, fully 23 tons of matter are taken out on an average. Say, to mine 23 tons of matter, at $3.45 per ton, $79.35.

10 tons of ore from 23 tons, at $7.93	$79.25
Assorting 10 tons of ore from 23 tons of rock, dirt, etc	10.00
Cartage from mines to railroad depot, from 3 to 22 miles, $2 per ton	20.00
Freight on 10 tons to smelter, say, average from 60 to 700 miles.	60.00
To smelt 10 tons ore in bullion lead, $6 per ton	60.00
Total	$229.35
As ores do not average over 15 per cent per ton of 2000 pounds, it takes 10 tons of ore to produce 3000 pounds bullion, at 4¾c.	$142.50
Average amount gold and silver in 3000 pounds bullion, at $60	90.00
Total	$232.50

"Or profit to mines of $3.22 on 10 tons of ore, if the following prices are obtained :

Price of 3000 pounds bullion lead, at $50 per ton	$75.00
Freight to New York or Newark, at $31.50 per ton	47.25
Cost of separating 3000 pounds (1½ tons), at $12 per ton	18.00
Gold and silver	90.00
Interest, two months, on outlay	2.32
Total	$232.57

Now, there is loss in smelting ores, from 2½ to 5 per cent, we have not calculated for.

3000 pounds lead at 4¾ cents	$142.50
Gold and silver	90.00
Total	$232.50

"You see there is loss. You see mining ores at $3.40, and should lead bring 4¾ cents per pound in New York, there is loss of 7 cents per ton. You can not say $3.45 is too much to mine lead. Coal companies obtain as much. These figures show why there are so many worthless mining companies—depreciation in the value of their stocks—as a good, fair mine don't pay to work, and few mines will produce 10 tons of ore out of 23 tons taken out.

If these figures were correct, the outlook for lead mining in the far West would be discouraging enough, not to speak of the Missouri mines. The latter, not having argentiferous ores, have always been looked upon as the weakest, and yet the large producers of that section can undoubtedly lay down lead in New York for 3·75 cents, and some of them for half a cent less.

It is a dangerous thing to generalize on the cost of mining of a metal like lead, whose production is scattered over so enormous an area. The conditions affecting the cost are not equal in any two localities ; and even in the same camp, they vary with every individual mine. A little more water, a crumbling roof, the existence of large areas of barren ground, a lower grade, the admixture of a small percentage of some refractory metal, or a large percentage of silica, singly or combined, may double or treble the cost of production or reduce the net returns. There is another point which must not be forgotten. When the margin of profit for a mine becomes so small as to imperil its existence, there are few managers

or boards of directors who can resist the temptation of doing less expensive dead-work, of taking risks by light timbering and of worrying along with an impaired plant of machinery. The falling off in ore supplies makes the smelters more eager to secure material, by scaling down the profits; and last, but not least, the railroads are liable to listen more attentively to complaints as to rates. In 1878 and the spring of 1879, when lead receded from 4·35 in January, 1878, to 2·87 in May and April, 1879, the statement that the mines could not live was repeated over and over again, and yet the only effect of low prices was to check the extraordinarily rapid pace at which the production was increasing. The following statement of the output for the period 1872 to 1882 will fully illustrate this point:

PRODUCTION OF LEAD IN THE UNITED STATES.

1872	25,880 net tons.	1878	91,060 net tons.
1873	42,540 " "	1879	92,780 " "
1874	52,080 " "	1880	97,825 " "
1875	59,640 " "	1881	117,085 " "
1876	64,070 " "	1882	132,890 " "
1877	81,900 " "		

Since then, great progress has been made. The extension of the railroad system in the West has rendered much more territory accessible, has opened out new sources of fuel supply, and has cheapened the cost of shipment to market. We have now magnificently appointed smelting-plants, under the management of skilled metallurgists. Some of them, and, to a less pronounced extent, all of them, use the lead simply as a carrier of silver. They purchase lead ores low in silver, which by themselves would not pay to work, for the sake of being able to work to advantage refractory silver ores carrying little or no lead. The desilverizing works have improved their methods and lowered the cost. All these circumstances have contributed toward lowering the cost, and making available ores of a grade which, five or six years ago, would have promptly wandered to the dumps, and better concentration has even reduced the quantity more. What this means, every mining engineer will fully appreciate. It brings down the cost in almost every department, and reduces the vicissitudes to which every mine is liable. It more than compensates for the increased outlay of working at greater depth.

To attempt estimates of cost of mining under such circumstances is more than hazardous. We do not know upon what rests the arbitrary assumption, quoted above, that it costs $7.93 to mine per ton of 15 per cent ore. We prefer to look at the problem from a different point of view. Let it be assumed that lead is worth 4 cents per pound at New York—it brings 4½ cents now—then the final products would be $80 per ton for the lead, and say $100 for silver and gold, which is a very low average. Deducting cost of desilverizing, $12 per ton—which leaves a good profit to the refiners, as it does not cost more than $9 per ton, and some of the works can do it for considerably less—and $31.50 for freight, we have net value at the smelter, in Colorado, $136.50. Assuming the ore to carry 15 per cent of lead, it would take, say, seven tons of ore to make a ton of base bullion. With the cost of smelting at $6 per ton, a figure which must not be confounded with the smelting charges, the smelter would have to pay $42 to cover his expenses, which would leave him $94.50 to pay for seven tons of ore at the smelter. Deducting $35 for freight from Leadville, would leave a net price at sampling-works of $59.50 for seven tons of ore, or $8.50 per ton for ore running 15 per cent of lead, and allowance being made for loss of silver, twelve ounces. This would be about equivalent to the payment of twenty-five cents per unit for the lead, a very low figure, it is true, and a smelting charge of $8 per ton. On the other hand, the average of Leadville bullion runs near $130 per ton, and the ores therefore range higher in silver. Our object was merely to show how low grade an ore can be worked. According to Messrs. ACKERMAN'S showing, it would be possible to mine ore at a profit which would carry only about 9 ounces of silver, provided lead brings 4¼ cents a pound in New York, even accepting their estimate that 13 out of 23 tons of mineral hoisted from the mine would go to the dump.

How large a margin some of the largest producers have is shown by the record of the Horn-Silver last year, when it made 16,000 tons of lead, nearly one ninth of the total production. The mine produced 47,232 tons of ore, at a cost of $4.44 per ton; the smelting at Francklyn costing $14.73, and the refining at Chicago $9.05. The ore carried on an average 37·8 per cent of lead and 32·2 ounces of silver, the loss in smelting being 9·71 per cent of the lead and 2·10 per cent of the silver. The average of the grade of the base bullion produced in Utah was 93 ounces per ton, or, deducting allowance for silver to desilverizing-works (5 ounces), 88 ounces per ton, having a value of $95 per ton at New York, with silver at $1.08 per ounce. The dividends during 1882 amounted to $1,200,000, while the net receipts from the sale of lead were $1,326,664.23, thus indicating that the silver paid for nearly the entire cost of extraction, treatment, administration, and marketing. Like all others, it will of course suffer from a low price of lead, but will, with the same grade of ore and the same cost of mining go on producing uninterruptedly.

It will not be denied, of course, that low prices of lead will seriously affect a large number of mines in the West: but to state that even a small minority of them have reached the point where they must stop or make heavy drains on the resources of their stockholders, is somewhat rash. In spite of the disapproval of our Western contemporaries, we must, however, repeat our warning to all interested in the metal, that they should prepare for low prices. We are not inclined to rush at the conclusion reached by our contemporary, the *Iron Age*, that we shall not stop until the export point is reached. Even if there should be no revival of the demand, the decline will probably be gradual. An attempt to stem it by claiming that the point is nearly reached when there will be a curtailment of production does injustice to our mining enterprises in the far West.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Purchasers of Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you give me the names of English companies buying copper matte, having agents in this country? Our mines are located in Old Mexico, and we are about to start our works. We desire to sell our products to English companies on account of the free tariff between Mexico and England. L. C.

YORKVILLE, ILL.

[We have heard that at least one English concern and one German works buy mattes in this country through local agents; but in the absence of direct communication with them, are not at liberty to give their names. We would, however, call the attention of our correspondent to the fact that American works are not necessarily barred out because there is a duty on copper in ore or mattes. It may be imported, converted into ingot, and re-exported under the drawback clause. The latter, it is true, has troublesome restrictions; but our correspondent owes it to our home industry to give it at least an opportunity to bid. If he will address Messrs. Pope, Cole & Co., of Baltimore, Md., or the Orford Copper and Sulphur Company, Nos. 37 and 39 Wall street, New York, he may possibly find it unnecessary to ship to Europe directly.—ED. E. AND M. J.]

THE TROY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

After a few hours had been devoted to visits to a number of collar and cuff factories and laundries, the

THURSDAY'S MORNING SESSION

was opened with a paper by Dr. Persifor Frazer on

NEW FOSSILS RECENTLY DISCOVERED IN THE PEACH BOTTOM SLATES

in York and Adams counties, Pa. The age of the early Cambrian rocks has been the subject of considerable discussion among geologists. One class believes that the Potsdam and Calciferous, and even the Hudson River, belong to a much higher horizon than the lower Paleozoic, while others hold that all three belong below it. Professor Dr. Persifor Frazer has made an interesting study of the Peach Bottom slates, and has found in them fossils which have been submitted to Professor Hall, of Albany, for determination.

Professor Frazer then called the attention of the members to the color of an anode used in the electrolytic determination of copper. Mr. Mackintosh, who has had a wide experience in this class of work, explained that the dark film on the anode was produced by a deposit either of peroxide of manganese or of peroxide of lead.

Mr. H. M. Howe, of Boston, then read a paper on an ingenious proposal for a Systematic Nomenclature for Minerals, to which we shall have occasion to refer at greater length in the future. Professor Egleston, in discussing the paper, gave the results of his experience in teaching mineralogy during the past twenty-one years.

The session was concluded by the presentation of a note by Mr. P. Barnes, of Springfield, Ill., on the water-gas producers at the Elgin Watch Company's works. The works had been provided with a plant for illumination by means of water-gas, and the idea was natural to attempt the use of water-gas also for firing the boilers, the air-blast being heated by the waste gases. It was found that, with coal at $5 per ton, the gas would have to be furnished at as low a figure as 5 cents per 1000 cubic feet before the gaseous fuel could compete, in the point of economy, with coal. The attempt was abandoned.

THURSDAY AFTERNOON SESSION.

The last session was opened with the election of a large number of members and associates, followed by the reading of a paper by Mr. John Fulton, mining engineer of the Cambria Iron Company, Johnstown, Pa., on

THE PHYSICAL PROPERTIES OF COKE AS A FUEL FOR BLAST-FURNACE USES.

Mr. Fulton, to whom belongs the credit of having first and most thoroughly inquired into this special subject, gives the results of his observations, made as early as 1875, to investigate the causes of the lower value of a coke produced from local coals at Johnstown, as compared with fuel from the famous Connellsville region. Chemical analysis gave no cue, and he turned to physical properties distinguishing them to explain their relative values. Mr. Fulton goes over the ground traversed in recent publications in a controversy between the Connellsville *Courier* and *The Virginias*, and adds a few data confirming former researches, and on the whole his paper contains little that has not been touched upon in them. After speaking of the suggestions made in *Coal*, that the blind following of the Connellsville coking methods has ignored the character of the coal, Mr. Fulton states that the Illinois Central Iron Mining and Coal Company is using a more rapid coking, with good results, by sustaining

the heat in its Thomas ovens, 36 by 8 by 4½ feet, and by pushing out the hot coke and quenching on the outside of the oven. Mr. Fulton, however, justly insists that no application of temperature or pressure should be used, which would tend to bring about the undesirable dense structure of, for instance, natural coke. If rapid heat is required, oblong ovens with or without flues, may be readily adopted without deepening of the coal charges to produce undesirable density of coke.

Mr. W. F. Durfee read a paper giving a minute description of a chemical laboratory erected in 1863, as an adjunct to the experimental steel-works at Wyandotte. He gave a sketch of the line of investigation followed out, and the often ludicrous opinions and statements advanced to hinder work at "Durfee's apothecary shop."

Professor Dr. Persifor Frazer followed with Notes on the Serpentine Belt of Chester County, Pennsylvania, and Supplementary Remarks on the Rocks of South Wales. Mr. F. W. Gordon, of Messrs. Witherow & Gordon, Pittsburg, Pa., in a paper entitled Boilers and Boiler-Setting for Blast-Furnaces, explained with the aid of diagrams the latest methods of boiler-setting introduced by them in their work, the principal feature of the design being the arrangement for conducting gas and air into the combustion-chamber. Messrs. Barnes, Durfee, and Birkinbine spoke on the subject, the discussion drifting into the causes of boiler explosions at blast-furnaces as influenced by the boiler setting.

Mr. F. P. Dewey, of Washington, gave the results of his observations on a tour of inspection in Canadian iron mines, which elicited no discussion.

The last paper brought before the meeting was that of J. H. Clemes, of Sonora, Mexico, Notes on an Experimental Working of Silver Ores by the Leaching Process, to which we shall refer at greater length in a future issue. The results were subjected to a critical review by Mr. C. A. Stetefeldt, who expressed doubts as to the accuracy of the analysis of the ore given, and who gave a very instructive summary of his experience and that of Mr. C. A. Russell, of the Ontario mill, on many points involved. Professor Egleston, too, spoke at length, dwelling particularly on the necessity of leaching with an ascending current and on the danger of using too much salt in chlorination.

A letter by Mr. Bridgeman was submitted, calling attention to the wish expressed by Bergrath von Groddeck, of the Clausthal School, to collect typical specimens of the ores, country-rock, etc., of the American mines, with a view to aiding him in his researches on ore-deposits. The communication was favorably received, and will, we trust, lead to numerous responses.

After the reading of a number of papers by title, and the passing of resolutions acknowledging courtesies on the part of local members and firms, the meeting adjourned.

In the evening, 125 members, their ladies, and their Trojan friends, sat down to the subscription-dinner, which passed off pleasantly.

THE EXCURSION TO THE HUDSON RIVER ORE-BANKS.

On Friday morning, a special train took the members to Burden station, on the Hudson River Railroad, between Livingston and Catskill stations, to examine the property of the Hudson Ore and Iron Company, of which James A. Burden is president, and to whom the credit of having detected the value of the deposits is due. The discovery of the principal vein is due to a systematically organized search for ores throughout the entire Hudson River valley. The ore of the principal of the two veins, the Dickson, escaped the attention of those working in the vicinity a few years ago, as it is a carbonate, and resembles more a limestone than an iron ore. The party was first conducted to the roasting-kilns, of which three are now building in a small ravine. These kilns, very substantially built, have a hight of 60 feet, and an inside diameter of 21 feet, contracting from a point 22 feet 9½ inches above the ground level to 15 feet 6 inches at the discharge, 10 feet 3 inches above the level. The shaft rests on six cast-iron pillars, there being a discharge-slide between each pair of pillars. A central discharge-cone projects into the kiln in the usual manner. This unusual hight of the kiln was chosen because experience with experimental kilns, 15 and 30 feet high, at the mines proper, showed that the ore has a tendency to clinker or "loop," which interferes with the expulsion of the sulphur. It is believed that the additional hight will destroy all tendency to looping. The kilns—of which three are nearly finished, and to which two more are to be added, the total contemplated plant being ten kilns—will be charged directly from the drop-bottom mine cars, which will be run over their tops on a track. The fuel to be used will be anthracite culm, the total quantity used being two per cent. The ore is drawn directly, in a hot condition, from the discharged chutes, and is weighed, so that the sales of ore are made on the basis of dry material. The kilns are rated at a capacity of 200 tons a day. The main object, of course, is to expel the carbonic acid, but they will at the same time perform the important office of reducing the quantity of sulphur in the raw ore.

After the visit to the kilns, the party partook of a luncheon served on the train, and then boarded a train on the narrow-gauge railroad leading to the mines, to the village of Burden, where a considerable number of workingmen's houses have been put up. The party first ascended a knoll through which the Cannon, the lower vein, passes, and on which are the openings of a party of Pottsville capitalists now abandoned. From this knoll, the course of the upper, the Dickson vein, could be traced by a number of shallow openings on it. Altogether, the vein has been followed for a distance of fully five miles. The principal work has been done at one point, where a shaft has been sunk three hundred feet deep, and headings have been driven. The Dickson vein at this point has a total thickness of 24 feet of ore, the firm hanging-wall being siliceous, while the foot-wall is shale. It does not appear likely that with ample pillars much timbering will be needed. The bed dips one in three. The mining work is laid out in the manner customary in the anthracite regions, the slope having a double track, upon which trains of cars will be hoisted. Only one rope is used, for what reason is not apparent. There is a Rand duplex compressor, with a plant of 16 drills, the mining being done by contract, we understand, for 40 cents a ton. There are at the slope three kilns, two 15 feet high and one 30 feet high, the cars being lifted to their top level by an elevator. These are merely experimental, and a considerable quantity of the ore is now being stocked on a dump for delivery to the new plant of kilns. A large quantity of washed ore is piled up under the kilns. It exhibits, however, the defects of irregular roasting, so that, we presume, the roasted ore prepared in these kilns contains more sulphur than it will when the permanent kiln plant is brought into use.

Much of the ore is so close a mixture of the minerals of which it is an aggregate that it is difficult to trace its mineralogical composition. Some of it, however, coarse in grain, shows spathic iron, calcspar, seams of iron pyrites, and occasionally gypsum. Analyses of the roasted ore show the following composition:

Roasted Ore from Hudson River Ore and Iron Company's Mines.

Metallic iron	51·520	56·080	52·05	51·09	51·880	51·160	50·820	51·296	52·580
Silica	8·760	8·970	8·08	9·14	8·860	9·200	9·030	....	8·110
Phosphorus	0·024	0·029	.....	0·03	0·034	0·029	0·031	0·027	0·033
Sulphur	0·657	0·730	.....	0·72	0·682	0·350	0·600	0·672	0·530
Lime	4·560	.....	3·22	.....	.....	.....	.....	.....	.....
Magnesia	7·390	.....	6·81	.....	.....	.....	.....	.....	.....
Alumina	1·270	.....	2·60	.....	.....	.....	.....	.....	.....
Oxide of manganese	3·190	.....	....	.....	.....	.....	.....	.....	.....

The ore, it will be seen, runs very uniformly in iron and silica. Magnesia seems to predominate over lime, while the phosphorus is always low, coming below the specifications for Bessemer pig. The sulphur, with one exception, goes above one half of one per cent, and will require careful attention to the character of the fuel and pretty high heats to bring within the requirements of steel producers. We presume that the samples analyzed do not represent the results attainable with better roasting facilities, a fact which is indicated by the low figure in one of the analyses. How far an increase in the percentage of pyrites in the ore mixture at greater depth will affect its quality remains to be seen. The depth reached, 300 feet, is presumably below drainage level, or near it, so that probably the maximum has been attained. Careful roasting will cope with it. The ore roasted is porous and easily reduced. The use of Hudson River ore at Crown Point shows the following result:

BURDEN WHILE WORKING MILL IRON WITH ALL LAKE CHAMPLAIN ORES.

Fuel.	Ore.	Flux.	Daily product.
4400 lbs.	5600@6000 lbs.	60 per cent.	54 tons.
	WORKING ONE EIGHTH HUDSON RIVER.		
4400 "	6200 lbs.	52 per cent.	60 "
	WORKING ONE QUARTER HUDSON RIVER.		
4400 "	6280 lbs.	44 per cent.	64 "

These figures illustrate the advantages of an ore approaching hematite over the dense and siliceous magnetites of Lake Champlain. The Hudson River Ore and Iron Company has its plans for a total output of 2000 tons of ore per day, and its policy is understood to be to market it at a low figure, in order to compensate for the high cost of fuel in the East. The shipping facilities by water on the Hudson River and by rail over the Hudson River Railroad are exceptionally good, and chutes and docks are now building to utilize the natural advantages. It is stated that, in all, the company will have expended upward of $500,000 before the improvements now making are completed.

AMONG THE IRON-WORKERS.—LEBANON.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: One can go but a short distance in Pennsylvania, without hearing repeatedly of her great coal and iron interests; on all sides, if he goes to her industrial centers, does he hear the prospects discussed. The Doctor and I were much interested in blast-furnaces and other components of the iron plant, and determined to see the actual operations as they are carried on throughout the State. Winter is not the best time to study the resources of a country, and particularly if one wants to see mining and smelting going on; but as it was the only time at our disposal, we determined to make the best of it, and start out in spite of the January weather. On the morning of our departure, the heavens looked decidedly gray and snowy, and a slight sleet was falling. However, we concluded not to wait, fearing lest the whole month should bring no more cheerful prospect.

The Philadelphia & Reading Railroad, as it winds along the Schuylkill, soon carries one into the heart of the eastern iron country. The road hardly leaves the city where so many industries find their market, before it is in the midst of the busy producers. From Phœnixville onward, accumulating signs bear witness to the great importance of these staple industries. At the time of our visit, all lay beneath a broad mantle of snow, broken only by the dark chimneys and furnace-stacks of some factory or iron-works. The cars, as if in contrast with the disagreeable exterior, were excessively warm, and the Doctor and I were for a time in much greater danger of roasting than of freezing. The driving sleet and steam-coated windows shut us off from the outside world; the isolation made the passengers communicative, and it was but a short time before we found out the destination and partial biography of most of our neighbors. The delicate-looking lady, wrapped up in furs and shawls, was bound for the Sanitarium at Wernersville, while the hearty, prosperous-looking man at her side was off for a visit to his furnaces—in these days of iron depression, we should perhaps say, the *apparently* prosperous; and so it was throughout the crowd, each in pursuit of some object, unmindful of storm and discomfort. A ride of a little over three hours brought us to Lebanon, and here we made our first stop.

Lebanon had always been synonymous in our minds with Weimer, so our first inquiry was for his works. The station-master gave us the necessary directions and politely took charge of our hand-satchels until we should determine on a hotel. The Doctor was anxious lest we should not get them back again when we wanted, so he questioned the agent as to how long the office kept open. The man smiled, as he replied: "We're open all the time, save a few hours on Sunday." The Doctor and I were quite surprised at such activity; for we expected to find rather primitive arrangements as soon as we left the metropolis. The Weimer Machine-Works were fortunately quite near the station, so that we had to take but a few steps to reach them. The offices and drawing-rooms are located in a comfortable and pleasing building recently

erected; while the works proper, the machine-shops, casting-rooms, etc., give some indications of the extensive business carried on by the firm. Blowing-engines constitute the chief product of the works, although all articles of blast-furnace mechanism are included in the list. Engines of various sizes, and in all stages of manufacture, naturally formed the most conspicuous objects in the workshops. One huge machine destined, I think, for some firm in Alabama, had an air-cylinder of seven feet: it would seem an efficient aid in helping a furnace digest even such a hard diet as magnetite and limestone. In another part of the works, large iron pipes for the hot-air stoves were casting. The molder's art seemed most wonderful to the uninitiated. Molds of large size and difficult pattern were so nicely wrought that the molten metal could not but confine itself to their limits. Great ovens, large enough, but far too heated for human habitation, were accessible from the casting-rooms, so that the molds might be properly dried before being intrusted with the liquid iron. The shops held our attention for some time, but our chief interest centered in the drawing-rooms; for from them issued the elaborate plans necessary for such large undertakings. A commodious, well-lighted room afforded every facility for the draftsmen engaged in working up the details of the furnace mechanisms. Some forty ample drawers accommodated the large collection of tracings and original drawings. Formerly, the drawings were made in pencil on regular drafting paper, and then inked in; tracings on the prepared cloth being then made from these original designs. At present, however, the drawings are only made in pencil, traced on the prepared cloth, and from this tracing the necessary copies got by the popular "blue process." The more recent designs are patterns of elegance in furnace construction; the light and pleasing proportions being in marked contrast with the clumsy masonry of a few years back. The conditions of production which must be considered by the rational designer, and which decide the resulting proportions, are so very numerous that one of these apparently simple designs is the outcome of no little thought. Ore, fuel, flux, blast-pressure, and temperature, etc., all have weight in determining the proper shape of a furnace, and it is only of late years that these important factors have received their proper consideration. The present tendency toward high shafts and lighter construction is fully illustrated by the numerous designs of old stone furnaces which have been enlarged by superstructures of brick and iron. Indeed, a most important branch of the firm's business is in modernizing old furnaces, one design in particular having for its foundation a heavy stone structure fully one hundred years old. As the works were established in 1856, the proprietors have had ample time for experience. One old machine in the shop interested us not a little on account of its history. It was invented in 1857, but was never used to any extent. This present year it will be called into requisition, and is undergoing the necessary preparations. That the head of the firm, Mr. P. L. Weimer, has been most actively employed during his long years of service, is fully shown by the number of patents which have been granted him for his numerous furnace and mechanical inventions. Up to the present time, he enjoys the protection of about one hundred and seventy-five letters patent. Most readers will probably be ignorant of the cost of a furnace plant, and, as an estimate from a reliable source, it may not be uninteresting to record the expense of a small furnace built last year in the neighborhood of Carlisle. Like all the rest of its work, the firm has kept tracings of the designs, and we were pleased to have the opportunity of examining them and of learning the cost. The furnace was built on modern principles, thus saving heavy masonry and castings, and, while more desirable than the olden style, was also less expensive. Though the dimensions were quite modest, being but fifty feet high and eleven feet bosh, yet the furnace, when fed on coke, was capable of a daily output of from forty to fifty tons. The total cost of the work, stack, blowing-engine, pipe-stove, and in fact every thing exclusive of the ground, was a little under $40,000, and we were told that it was one of the cheapest plants ever put up. The iron-work on this plant cost $25,000, but part of the price was paid in the pig-iron produced when the works were in operation, so that the cost would really be somewhat less. Mr. Weimer, when he learned the scientific purpose of our trip, was very attentive, and on our departure gave us copies of some of his most improved designs for furnace plant. We were quite anxious to obtain drawings of the small furnace spoken of, so he kindly offered to have copies made and sent to our address in Philadelphia.

Though we had by no means exhausted the resources of the works, we concluded our visit, and turned our attention to the Colebrook Furnaces, about a mile farther down the railroad. Our most direct path lay in the beaten track made by the workmen on the snow-covered sleepers. The flagman told us that, as we would meet any train that might be coming along just then, we were in no danger on that score. I had never quite understood how so many accidents occur to people walking on the track; but it became a little clearer to me a few minutes later, when a glaring head-light suddenly loomed up before us, and we had to hurriedly spring aside into the snow. The day was nearly spent when we reached the furnaces, so that our view was more general and impressive than detailed and strictly scientific. The Colebrook are considered the most modern furnaces in the neighborhood; but they have the misfortune, we are told, to be the result of ideas indiscriminately collected, rather than growing out of any systematic design. The plant at these works has been fearfully expensive, the two furnaces alone costing some $800,000. When to this is added the additional cost of Whitwell stoves, engines, dressed-stone casting-houses, and other such expensive incidentals, we have an aggregate of capital which can ill afford to be idle when the financial barometer shows depression. A deepening twilight warned us that strangers who walk on busy tracks had better get hotel-ward; so, after only a hasty glance, we turned back again toward the town. The men were drawing cinder off from the furnace; and as we glanced back at the works, its ruddy reflection spread over every thing. The dull, monotonous gray tints were changed to bright rosy ones, and the effect recalled to our minds the Plutonists and their fiery hypothesis of the world-formation. The sulphurous fumes and odor of overheated iron seemed to cling to us and fill our nostrils during the entire night. Nor were our nerves particularly prepared for sleepfulness, when the room clerk informed us, after assigning our persons to the third floor, that there were three avenues of escape, should we be overtaken by that recent nightmare of the modern traveler—fire.

CARL.

THE MANUFACTURE OF BLUESTONE AT THE LYON MILL, DAYTON, NEVADA.*

By J. E. Gignoux.

The origin of the bluestone industry at Dayton, Nevada, which subsequently attained such magnitude, was due to the endeavors of certain mill-owners, who found it necessary to refine, in order to profitably dispose of the bullion which they obtained in working Comstock tailings. By the base process, as the one in vogue was termed, it was found advisable to employ large quantities of copper sulphate in amalgamating, and even as much as 20 pounds to a ton of tailings were used. In consequence, the bullion produced contained from 80 to 90 per cent of base metal, principally copper. Besides the loss in copper, the mill-owner was obliged to bear a heavy discount on his produce.

The first crude attempts at refining were made by the Lyon Mill and Mining Company, and were in imitation of the sulphuric acid process practiced at the mints. The bullion proved to be too base for its success, owing to the great length of time required to dissolve in acid, and it is also stated that a significant mechanical loss of the precious metals was found to be unavoidable.

Subsequently, the bullion was subjected to a sulphurizing process, which consisted in placing in iron kettles charges of about 400 pounds of metal with 20 per cent of sulphur. Layers were made by placing barrel-staves alternately with the charge. The kettles were provided with cast-iron covers having flanges corresponding with similar flanges and bolt-holes on the kettles. When charged, the cover was luted and tightly bolted to the kettle, when a gentle heat was applied for about nine hours. On becoming cool, that portion of the metal converted into sulphide was removed, the remainder received new sulphur, and the process continued until all the metal was converted, for which about 40 per cent of the original weight in sulphur was found necessary. The sulphurized material was next crushed in a Chili mill, passed through a No. 10 sieve, and sent to the furnace-house, where it underwent a desulphurizing roasting. This was performed in a small reverberatory furnace, which was charged with 400 pounds of the granulations. A complete desulphurization was effected in about ten hours, or until the whole was thoroughly heated to a bright red by a very gradually increasing fire. The charge, when drawn, was again crushed and passed through a No. 20 sieve, when it was again roasted in the same furnace, and converted into an oxide. Wood as free from pitch as possible was used, and air was admitted through the bridge-wall. This roasting occupied about twelve hours, and required constant stirring. Leaching was then resorted to, and carried out in almost the identical manner to be subsequently described.

The method in use at the present time is based upon the partial separation which takes place in the retorts when great precaution is used to avoid melting or overheating the amalgam, and the bullion obtained is in such a porous condition as to allow of its being "brittleized," pulverized, and roasted. Two classes, designated as white and base metal, were obtained. The white metal, as its name implies, is of white appearance, and is formed next to the iron of the retort, and is of much denser structure than the base, acting as a coating or shell around the latter. It consists of about 80 per cent of silver, 15 per cent of copper, and the remaining 5 per cent of iron, lead, antimony, with a little gold. The base metal is reddish-brown in color and spongelike in appearance, forms in the center of the retort, and consists of about 90 per cent of copper and iron, and 10 per cent of silver, gold, and other metals, nearly all the gold contained in the amalgam going with the base. In quantity, the base metal greatly exceeds the white. Formerly, these products were treated separately in refining, although the process was identical except as to the quantity used in the charges. The white metal being less bulky, and having less copper to be oxidized, was treated in larger quantities. In roasting, 400 pounds of base and 500 pounds of white metal were usual charges, and in the dissolving-tubs 1000 pounds composed a charge for base, and from 1200 to 1500 pounds for white metal.

The retorting is carried on for twelve hours. During the first four, a low temperature is maintained, but is gradually increased until the quicksilver begins to distill, when the heat is increased until the operation is terminated. Occasionally, a small loss of quicksilver is experienced on account of imperfect retorting. This item is, however, insignificant when compared with the saving made by this manner of retorting when the expense of the sulphurizing process is considered. The retorts used are cylindrical, and hold 1700 pounds of strained amalgam when a little more than half filled.

At the Dayton Works, the sulphuric acid parting process was introduced, and thereafter no distinction, as previously, between white and base metals was made. All the bullion as it comes from the retorts is broken with a sledge-hammer into pieces about the size of an egg, and thrown into the roasting-furnace after the roasting charge has been withdrawn, and remains over night on the still heated hearth, no more fuel being necessary. From 2000 to 3000 pounds are charged in this manner. In the morning, it is drawn, when it presents a dark gray to black color, and has become quite brittle. It is then crushed in a Chili mill, and is sifted by hand through a No. 20 sieve. One Chinaman does the work. The power for the mill is supplied by the main shaft of the pan-mill, and is inconsiderable.

The pulverized metal is then returned to the roasting-furnace, when it is weighed, and an increase of weight of about one tenth of one per cent is usually found, due to the wearing of the wheel and pan of the Chili mill.

The roasting-furnace is a small reverberatory, the hearth of which is 6 by 10 feet, with the corners filled, giving an oval shape. The arch is low. There are two working-doors, one front and one back, situated about the middle of the furnace. The hearth is laid with Scotch fire-brick set on end. A charge of 500 pounds of the metal is placed in the center of the furnace and spread out until about 3 inches deep. It is kept constantly stirred with an iron paddle of ¼-inch iron, 5 by 12 inches, attached to a handle of wrought-iron pipe 12 feet long, and terminating in a ring. When the charge has attained a dull-red heat, the workman throws over

* From advance-sheets of *The Mineral Resources of the United States*, published by the United States Geological Survey Department of Industrial Statistics. Albert Williams, Jr., Chief of Department.

that portion farthest from the fire to bring it next to the bridge-wall, and then moves all the charge back by slicing it with his paddle, and exposing a new surface to the heat. If the entire charge has become a bright red, care being taken to avoid a greater heat, it is kept in that condition for one hour before drawing. It is then spread out in an iron box 3 by 6 feet, and allowed to cool. When cold, it is carried to the bluestone works in charges of 1000 pounds, first being sifted, and any lumps that have formed being crushed. A gain in oxygen amounting in weight to about 5 per cent of the original charge occurs during roasting. It takes about ten hours to complete the operation, one man doing the work, and requiring about a quarter of a cord of wood.

Circular tubs, 7 feet in diameter and 4 feet deep, are used for leaching or dissolving the copper. They are made with staves cut from 3 by 4-inch joist, and bound together with two iron hoops 3 inches wide made of half-inch iron. The sides are vertical, and the bottoms are let into the sides. The lining is of 6-pound lead, except at the bottoms, and a strip one foot wide on the sides next to the bottoms, which consist of 14-pound lead. They are likewise provided with heavy false bottoms. Steam is admitted through an AA lead pipe, the lower end of which is closed, but has four holes bored in it about one inch from the end. Were the steam allowed to pass directly down through the pipe, it would soften and wear holes through the lead bottoms. The upper ends of the pipes are soldered on the iron steam-pipes, which are provided with valves for the convenience of the operator. The pipe system is suspended from the roof of the operating-room. Each tub is likewise provided with a cold-water pipe.

A bath consisting of 2½ pounds of 45 degrees Baumé sulphuric acid for each pound of copper contained in the charge is prepared by reducing the strength with water to 20 degrees Baumé, and is steamed until brought to boiling. The charge is then fed with a small scoop, and scattered over the surface of the bath, continual stirring being kept up with wooden paddles 9 feet long and having blades 4 inches wide. The strength of the solution is kept as near 40 degrees Baumé as practicable by occasionally weakening it. Usually, it takes two hours to feed the charge, but stirring and boiling are continued for four hours. At the end of that time, the bullion should present a white or light-gray appearance, which is dependent upon the success of the previous roasting, and it should be 900 fine or over. The dissolving-tubes are covered with boards and sacking, the steam is turned off, and the charge allowed to settle for four hours.

At times, a small quantity of silver is dissolved, and, in order to save it, the solution is drawn into precipitating-vats in which copper slabs have been laid, and the silver is thrown down as fine metal. The vats are circular, 10 feet in diameter, and provided with steam-pipes, the same style as those used for dissolving-tubs. They are lined with 6-pound lead on the sides, and 10-pound lead on the bottom, no false bottoms being necessary. The floor upon which they rest is lower than the floor of the dissolving-tubs, so as to admit of the liquor being drawn over with a siphon. After the solution has remained in contact with the copper slabs for several hours, tests are made with a salt solution, to determine the presence of silver, and when no further chloride precipitate is visible, the charge is boiled for an hour, and is then allowed to settle for two or three hours before being drawn into the crystallizers.

The bullion remaining in the dissolving-tubs is leached several times, first with acid, and then with water, being stirred and boiled each time. The first leachings go with the charge in the precipitating-vats, the subsequent ones to the weak-liquor tanks for concentration. The metal is placed in the filters, which are lead-lined barrels, provided with perforated wooden false bottoms covered with muslin, and with discharge-pipes let in below the false bottoms. Clean hot water is run over the metal until no more acid reaction is detected with litmus paper at the outlet pipe. All the water from the filters is collected in a tank, as a small quantity of silver is sometimes carried through. Drying the metal in iron pans heated to redness is next resorted to. The silver is then weighed and charged in the parting-kettles, the mint process being adopted, excepting that the gold is not again treated with acid, but is melted when about 700 fine. There being so little of the latter, it was found more economical to pay refining charges. Having the metal in a granulated state very much facilitates the dissolving in strong acid. A charge of 3000 ounces is dissolved in five hours' time with an armful of wood. The silver usually runs from 997 to 999 fine after melting.

What is termed the bluestone cellar at Dayton contains 40 crystallizers, arranged 20 on a side, with draining-tables built along the center of the room. In the floor, above the middle of the cellar, a large tank is sunk, in which is collected the liquor drawn from the crystallizers, after crystallization, and which is called the pump-tank. A leaden trough runs along under the draining-tables, and is connected with this tank, into which the crystallizers are first drained with a short rubber hose. The crystallizers are 7 feet long and 3½ feet wide on the top, and 7 feet long and 3 feet wide at the bottom. The bottoms and ends are lined with 8-pound lead, the sides with 6-pound. Altogether, 473½ pounds of lead are required for each tank. The wood-work is constructed of 2-inch planks, the ends projecting so as to receive half-inch round iron bolts, two on each end, to hold the sides together. No lead strips are used, it having been found more advantageous to allow the crystals of bluestone to form on the bottoms and sides of the crystallizers, from which they can readily be removed in large cakes requiring to be simply loosened with a bar-chisel. Boards and sacking are used to cover the crystallizers when the liquor is first introduced, and remain on for three of the five days allowed for the crystals to form. Keeping the liquor warm facilitates the crystallization. At the end of the fifth day, the strength of the liquor is found to be reduced to 28 degrees or 30 degrees Baumé. The bottoms are first loosened and taken out, then the sides, the bluestone laid on the draining-tables and broken up with a wooden mallet. After remaining from twenty-four to forty-eight hours on the tables, it is packed in barrels and stored.

Bluestone made in the above manner is of the best quality and compares favorably with Eastern and imported. It usually commands half a cent a pound higher price than that which is manufactured from copper ore. Each crystallizer yields from 700 to 800 pounds of good crystals, and about 100 pounds of broken and fine material taken out as slush, which is placed on separate tables arranged with a draining-tank, and when dry is set aside to be redissolved as refuse. About 3500 pounds make a refuse charge, and with the water necessary fill two crystallizers, and make first-grade bluestone.

The actual cost of producing bluestone from bullion is difficult to arrive at, owing to the copper having no definite value, and having already served a purpose in the amalgamation. Six cents a pound was paid for the copper contained in base bullion produced by other mills, and no charges for refining were made when under 600 fine in silver. This was found profitable when bluestone could be disposed of at 8 cents a pound. The cost of refining is about 2½ cents a pound for bluestone produced.

All the tailing-mills in the vicinity copied at least portions of the process in use at the Lyon mill. At the Atlanta mill, pains are taken to closely separate the base from the white metal when it comes from the retorts, the former only being refined, the latter melted and sold as 800 fine bullion. Besides the refining charges, they sustain a loss of 20 per cent of copper, less the actual cost of refining themselves. This loss is in some measure unavoidable at small mills, as they can not afford to allow their bullion to accumulate to such quantities as would insure economical refining.

At the Omega mill, there is a large refinery for treating all the base bullion produced at the mills controlled by the Pacific Milling Company. Each mill is provided with a Wiegand digester, which is an ingenious adaptation to this purpose of an old German method of separating lead from silver amalgam. The late Mr. C. Wiegand succeeded in parting the silver from the copper and gold by leaching the raw amalgam with heated quicksilver. While the silver is carried out of the digester, the base amalgam remains. Amalgam treated by his method, after straining, retorting, and melting, gives bullion 900 fine in silver. The difficulty experienced in heating the quicksilver, the loss through imperfect pipe-joints, that is sustained in handling such large quantities, also the cost of manipulation, all tend to make the process expensive; besides which, the copper still contained in the bullion, amounting to 10 per cent, is lost to the mills. The base bullion is refined in the manner described, and the bluestone made returned to the mills.

The facilities of the Dayton Works for refining bullion and manufacturing bluestone were greatly augmented by the erection of sulphuric acid chambers. The acid is made from sulphur mined in Humboldt County, Nevada, and is produced at an expense of about $20 a ton. The chambers have a capacity of about 2½ tons a day of 45 degrees Baumé. Concentrators are employed for producing 62 degrees Baumé acid for transportation and supplying the Carson Mint.

The demand for bluestone being much in excess of what could be made from the refining of base bullion, large quantities of it were manufactured from copper ore and cement copper. The prices at which the ore was purchased ranged from $2.25 a unit for 20 per cent, to $3.25 for 40 per cent, increasing 25 cents a unit for every 5 per cent increase in assay for the copper ore delivered at Dayton. A charge of $10 a ton is made for ores which require roasting.

The Walker River mines in Esmeralda County, Nevada, furnished most of the ore, which consisted principally of chrysocolla, azurite, malachite, cuprite, chalcocite, chalcopyrite, tetrahedrite, and chalcanthite in considerable quantities from the Bluestone mine. The cement copper came from Wheatland in California. The advantages which the miners derived from shipping rich ores which did not require to be roasted led them into the habit of assorting very closely, and reserving sulphuret and low-grade material for reduction at some future period, when the facilities for transportation shall have increased. In consequence, high grades of carbonates and silicates formed the bulk of the ore received at Dayton.

The copper roasting-furnace in use is a one-floor reverberatory, 30 feet long and 10 feet wide, with three working hearths and six doors, three of which are on a side. The fire-room is 17 inches. A low arch and perforated bridge-wall, the apertures communicating with the air, are used. The chimney employed for a direct draught is 30 feet high; but when the ore-drier is in use, the smoke is made to traverse a distance of 90 feet under drying-plates, and is then led off through a higher stack. Ore is fed through a hopper, and is discharged into small iron cars. One man working on a pass of eight hours performs the labor, fuel and ore being brought to him. A charge usually consists of 800 pounds, which is shifted every four hours. It is allowed to remain in the furnace twelve hours, thus making the capacity 4800 pounds a day. A little over three quarters of a cord of wood are consumed in twenty-four hours. Enough sulphur is present in the ore to ignite and burn on the first hearth, the charge requiring occasional stirring. On the second hearth, it is heated dull red all through, and does not need much stirring unless a disposition to cake is manifested. When the ore reaches the third hearth, the one nearest the fire-bridge, it requires more stirring and frequent removing back from the fire, as the heat is sufficient to melt the charge. A steady bright-red heat is maintained during the four hours it remains there. About twenty minutes' time is consumed in discharging, shifting the two other charges, and again charging the furnace. The cost of roasting is estimated at $7.50 a ton.

Ores which do not require roasting, and also those which have been so treated, are carried to the bluestone works, or to the mill solution tank, where they are used in making bluestone solution, which serves as an economical substitute for dry bluestone.

At the mill tower, acid is used for the bath, and many residues from the bluestone which do not contain much copper are also utilized. The solution is run into the amalgamating-pans from tanks where it has been reduced in strength to 20 degrees Baumé. The estimated cost of this solution is equivalent to 4 cents a pound for bluestone crystals, making an important saving where such qualities of low-grade tailings are worked.

The ore at the bluestone works is treated in dissolving-tubs similar to those used in refining bullion, acid being added in the bath in excess of 2½ pounds to the pound of copper contained, according to the nature of the ore. The absence or presence of lime or iron is taken into consideration. Sulphate of iron and gypsum, when these substances are present, crystallize with the sulphate of copper, deteriorating the quality of the bluestone, which is then of the second grade. As this grade is sold at lower prices than the first grade, and also because of a prejudice existing among some mill-men that better results in silver are obtained from the use of impure bluestone for pan amalgamation, a more ready sale exists for it than for the purer article. Owing to the impurities mentioned, a

much larger product is obtained than could theoretically be made from the copper contained in the ore.

The charges vary from 1300 to 1800 pounds, and the solution is made from 37 degrees to 40 degrees Baumé strong. Eight hours is the time usually occupied to make and settle a charge. It is drawn directly into the crystallizing-tanks in the cellar by means of a four-ply rubber hose, which is attached to a float in the tub to prevent disturbing the sediment at the bottom. A glass tube is inserted in the solution from time to time, and by closing the end before withdrawing it the quantity of clear liquor above the sediment is observed. The utmost precaution is necessary to prevent drawing the sediment into the crystallizers. About the same time is allowed for crystallization of ore solution as for bullion. A better grade of bluestone is generally produced by drawing off the solution sooner, as the sulphates of iron and lime form crystals on the top of those of sulphate of copper.

All the liquor from the crystallizing-tanks is drawn into the pump-tank, whence it is pumped by means of a steam-injector, made of lead, into high tanks on the upper floor, and from them fed into the condensing-pans. These consist of two leaden pans, one of which is set 8 inches higher than the other. The larger pan rests partly on iron plates, which are so arranged as to protect the lead from too great a heat. They are made of 16-pound lead, 6 feet wide; one 10 feet, the other 8 feet long. The sides are 12 inches high, and are surrounded by masonwork. The flues are built parallel with the greatest dimension of the pans, and the heat is made to traverse their entire length three times before escaping into a chimney 40 feet high. The fire-room is 20 inches. At the beginning of the concentrating operation, both pans are filled from the high tanks, and a continuous stream, equivalent to the loss by evaporation, is run into the higher pan and siphoned from it into the lower pan. It is kept at a quiet boiling temperature until the strength of the charge in the larger pan has been raised to 41 degrees Baumé; that from the smaller pan decreasing the strength to 39 degrees Baumé as it is drawn into the crystallizers in the cellar. A long four-ply rubber hose is used for the purpose. Two crystallizers hold the condensed charge and yield from 400 to 600 pounds of inferior bluestone, according to the quality of the solution used. Clear liquor from the settling-tanks, into which the residues from the dissolving-tubs have been washed, is likewise pumped into the high tanks and concentrated. Two charges can be condensed in the pans during twenty-four hours, with the consumption of one cord of wood. The boiler-man also attends to this fire. About one cent a pound for the bluestone produced was estimated as the cost of concentrating.

All washings containing copper in solution the strength of which is below 15 degrees Baumé are weakened to 5 degrees, and are then run into the iron tanks, in which the copper is thrown down. Old crystallizing tanks are used for the purpose. They are so arranged that the overflow from one passes into the another, until the liquor is free from copper. A false bottom is made in them of wooden paddles which are worn too short for further use in the dissolving-tubs, and about 300 pounds of scrap wrought-iron are laid upon it. When the precipitated copper covers the iron, it is washed down into the bottom of the tank and then allowed to accumulate. When removed, it is spread upon a wooden platform and sun-dried. It is then screened, and that portion which does not pass through a 20-mesh sieve is melted into bars and used in the refinery for throwing down silver. The finer portion goes to the roasting-furnace, to be subjected to an oxidizing roasting and used again in the manufacture of bluestone.

Not an unimportant factor in the product of the Dayton Works is the copper obtained from the United States Mint at Carson. This institution purchases the acid used in the refinery, and partly pays for it with copper solution. As the mint solution carries a great excess of acid, it has to be used in conjunction with cement copper, or rich ore, and is substituted for new acid in the dissolving-tub baths.

The cost of manufacturing bluestone from ore at the Dayton Works was estimated at 6 cents a pound when 20 per cent ore could be purchased at $2.25. The average cost of labor was $3 a day, chamber acid costing $20 a ton and wood $6 a cord. The wear of the sheet-lead, which, with freight added, cost about 11 cents a pound, and a lead-burner's wages at $4.50 a day, he having to be employed continuously, also formed an important item in the estimate.

During the years 1879, 1880, 1881, the output averaged about 320 tons a year. Several years previous, a much greater quantity was made and sold, taxing the capacity of the works. Since 1881, there has been a perceptible falling off in the demand, owing to a decrease in the tailings milling industry. Shipping to a foreign market is out of the question, on account of the cost of transportation, which likewise serves to keep foreign manufactured bluestone from coming into competition with that made in Nevada.

THE significance of the small quantity of carbonic acid in the atmosphere was fully appreciated during the first half of this century. Through careful researches, it was ascertained that the carbonic acid produced by the decomposition of organic substances, by respiration, by combustion, etc., is absorbed, through the agency of the sun's rays, in the form of carbon. The question has been suggested whether the enormous quantities of coal annually burned in factories and dwellings might not have some effect upon the atmosphere, gradually increasing the carbonic acid in it. Dr. Clemens Winkler, of Freiberg, has gathered some curious figures on this point, which we believe will put at rest any fears on that score. There are very few, we imagine, who have any idea of the enormous quantity of carbon which exists in the atmosphere in the shape of carbonic acid. Dr. Winkler, from the known weight of the atmosphere and its percentage of carbonic acid, 0·04 per cent of the volume, has figured out that there are not less than 800,000 millions of tons of carbon in the air. The total production of coal in the world is roughly 360 millions of tons, equal to 942 millions of tons of freshly cut pine, or 2625 millions of trees of 80 years' growth in a moderate climate. The total population of the world, about 1200 millions of human beings, annually, in maintaining life, breathes into the air carbonic acid enough to equal 180 millions of tons of coal. And yet the quantities of carbonic acid thus sent into the atmosphere are insignificant as compared with the enormous quantity of 800,000 millions of tons referred to.

A MODERN ENGLISH STEEL PLANT.

The most recent addition to the works in Middlesborough, says *Iron*, is the Northeastern Steel-Works, which were begun in 1881, and the company made its first heat of Bessemer steel on May 31st, 1883. Actual work was begun in double shift in the middle of the following month—June—from which time up to the present, the works have been in constant operation, and the output in each week has exceeded that of the preceding one, the rate of working now being from 1000 to 1200 tons weekly. The works occupy 22 acres of ground, which is in the form of a triangle, lying with its base toward the river—the river itself forming the north boundary. The works were designed by Mr. Arthur Cooper, the manager, who has so arranged them that the work proceeds regularly on, stage by stage, from one end to the other. The various departments are placed under one main roof, which is 1030 feet long by 160 feet wide, the converters being at the northern end, and the cogging and rail-mills and finishing-shop following in proper sequence. The raw materials are brought in to the rear of the basic Bessemer converters (which have Holley's movable shells), and where there are three cupolas for melting the pig-iron. The dolomite for lining the converters is stored in bunkers, and before being used is calcined in the cupolas, of which there are three. The calcined material is crushed under edge-runners, and fed into incorporating-mills, where it is mixed with tar to the consistency of stiff paste, in which condition it is used for lining the converters and making the bottoms. Over the converters is a 60-ton traveling-crane, by which they are lifted bodily from their trunnions and carried to the rear to be lined, where they are arranged under a 30-ton traveler. At present, the pig is melted in cupolas, but it is intended eventually to work on the direct system, taking the molten iron from the adjacent furnaces directly to the converter. The three pig-iron cupolas are arranged so that the raw material is taken up to a hight of 21 feet by means of a 20-ton hydraulic lift, and there charged with the necessary quantity of coke and limestone. When melted, the iron is drawn out on the ground floor into 12-ton ladles, and then pushed forward by means of a small locomotive to another 20-ton lift, by which it is hoisted to the converter stage-level, which is 21 feet above the ground line, also on the same level as the charging stage. It is then pushed forward to the converter by a small locomotive which is in waiting on the converter staging. The ladle is then tipped by means of a worm-and-wheel, and the metal passes through a short spout into the converter. The spiegel cupolas are close by the converters, and lime is shot into the converters from an upper platform. After the metal has been blown, it is teemed into a ladle carried by a transfer-crane. This crane receives from two converters, another similar crane receives from other two converters, there being four 10-ton converters. The ladle carried by the transfer-crane is taken by a center casting-crane, which covers a pit 60 feet in diameter. This crane was specially designed for the plant by Messrs. Head, Wrightson & Co., of Stockton. The ingot molds are removed by four 6-ton cranes arranged around the pit, the ingots being taken thence to the re-heating furnaces in the cogging-mill. Soaking-pits on Mr. Gjers's system have been constructed, and will shortly be started. The converters are blown by a pair of vertical compound condensing engines, the high-pressure cylinder being 40 inches in diameter, and the low-pressure 66 inches, with a stroke of 5 feet. The blowing-cylinders are 54 inches in diameter. There are two pairs of horizontal pumping-engines for the hydraulic work, there being four pumping-cylinders on each engine. The steam-cylinders are 26 inches in diameter, with a 3-foot stroke; the pump-plungers being 6 inches in diameter.

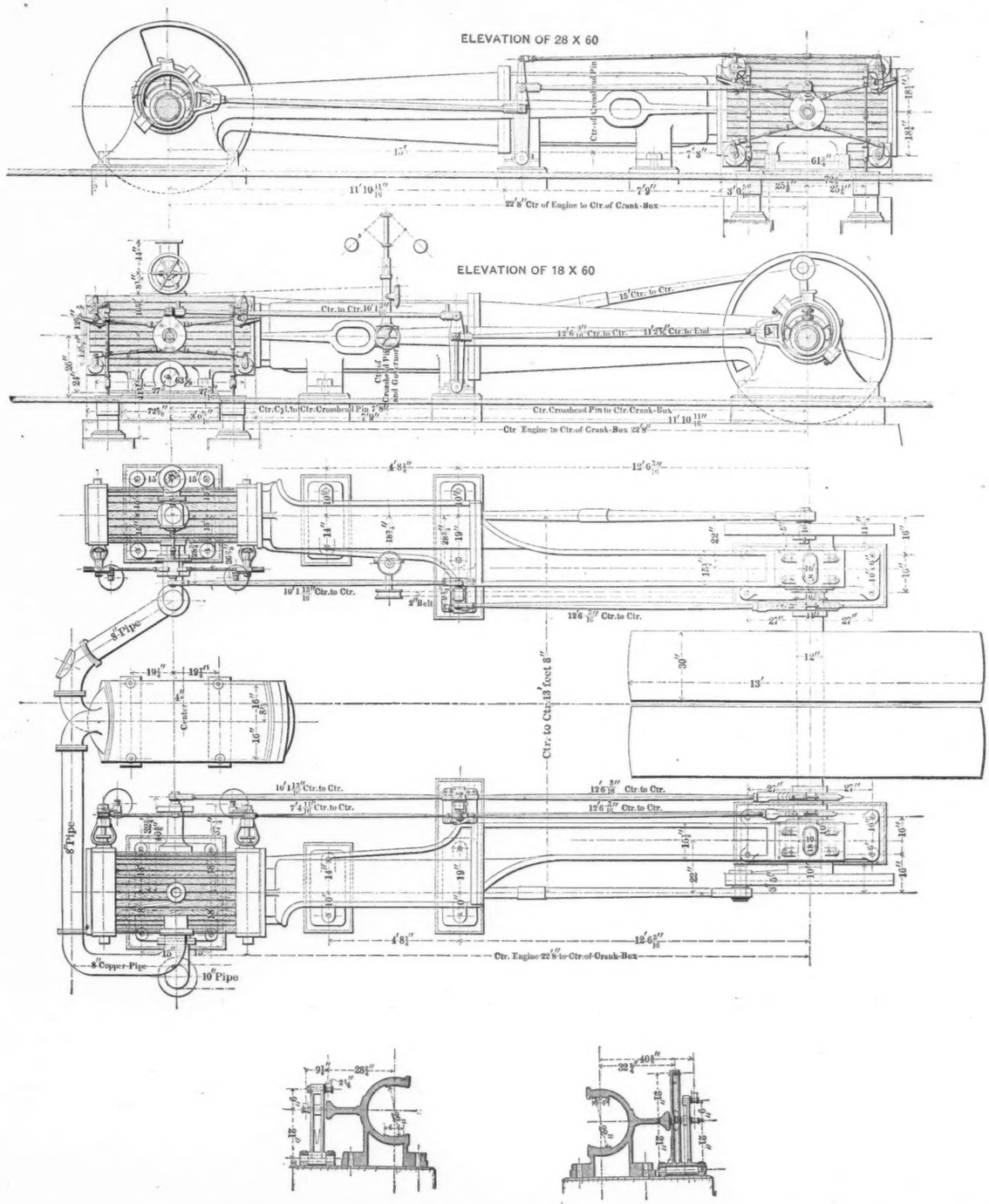
The cogging-mill rolls are 36 inches in diameter and 7 feet 6 inches long. The engines for driving this mill have 40-inch cylinders and a 5-foot stroke, and are geared at 1 to 2. In this mill, slabs 16 inches wide are made; also rail and other blooms. The bloom or slab having been brought down to the required size in the mill, is passed forward by means of live rollers to the bloom-shears, where the crop-ends are cut off, and the bloom itself cut to any requisite length. The blooms, if required for export, are then placed on a skid and moved along to the outside of the mill for inspection; but if they are to be still further manipulated, they are run down by means of live rollers to the rail and finishing-mill, the rolls of which are 28 inches diameter and 7 feet long, and are driven by a pair of 50-inch cylinder-engines with a 54-inch stroke. A train of rollers conducts the billet or rail, as the case may be, either to the billet-shears or the rail-saw. If the rails are making, after being cut to requisite length, they are taken on a skid to the hot bank and allowed to cool. When sufficiently cooled, they are removed by means of two 3-ton steam portable cranes to the cold bank, thence to the straightening machines and rail-drills, and afterward to the benches, where they are inspected and loaded on trucks, which are placed in docks alongside these benches. The company has commodious sidings, connected, of course, with the Northeastern Railroad system. The works afford employment to about 500 hands, and are producing about 1000 tons of rails per week by the basic Bessemer process, Cleveland and cinder pig being exclusively used.

JIGGED COAL.—A circumstance which has had a depressing influence on the smaller sizes of anthracite coal has been the growing quantity of jigged coal offered in the markets, being largely the product of working culm-piles, etc. While the growth of this industry will be hailed with pleasure by all who have been hoping for a reduction in the fearful waste in our anthracite region, the jigged coal unfortunately comes to the market too frequently under false pretenses. Every effort is made to sell it as fresh-mined coal. Some of it undoubtedly is, but some of it is not. Coal obtained from washing a culm-bank, after it has been subject to weathering for years, is undoubtedly a good fuel; but it can not, so far as we are able to judge by inference, claim to be as good as fresh-mined coal. Buyers will therefore do well to be on their guard.

We may here note that, from the accounts which reach us, the jigging operation is carried on in a very crude manner in some of the dressing-works. Sometimes, the jigs are choked with material, coming with a rush from the breaker; and sometimes, the jig is doing comparatively little. The arrangements for the delivery of the refuse and of the washed coal appear to be defective in many instances, and the quantities of water used generally excessive.

THE LEXINGTON MILL ENGINE.

We illustrate in our present number a specimen of modern engines, one of which was built for the Montana & Utah Mining Company, by Messrs. Fraser & Chalmers, Chicago, Ill. This engine serves as motor for the Lexington Mill, Butte, Montana, and is remarkable for its economy as well as its durability and beauty of design. It is a compound condensing engine, and is provided with a reheating receiver. The high-pressure cylinder is 18 inches in diameter and the low-pressure cylinder



COMPOUND CONDENSING CORLISS ENGINE AT THE LEXINGTON MILL, BUTTE, MONTANA.

28 inches, both having a 60-inch stroke. Both cylinders are provided with Corliss valves, and the admission of steam is controlled by the governor at the high-pressure cylinder, while the cut-off for the low-pressure cylinder is adjusted by hand, to adapt the engines to greater variations—for instance, to run a section of the mill only, and divide the work in such case equally between both cylinders. This adjustable cut-off is a novelty in principle and design, and permits cutting off the admission of steam at any point from zero to full-stroke, while the common Corliss cut-off is limited to four tenths of the stroke.

The receiver, placed between the steam-cylinders, is provided with return-flues, for the circulation of live steam from the boilers, to reheat the steam before entering the low-pressure cylinder. The exhaust steam, leaving the low-pressure cylinder, passes through a feed-water heater, similar in design to the re-heater, and then enters the siphon condenser.

No critical tests as to economy in consumption of fuel have been made as yet; but the practical results are surprising to mill-men. The Lexington Mill is a dry-crushing silver mill, consisting of 50 stamps of 950 pounds each, with all conveyers and elevators, two five-stamp salt batteries, 20 pans, 10 settlers, 2 agitators, screens, furnace conveyers, and feeders for two Stetefeldt furnaces, which machinery, with shaftings at usual terms, may be rated at 275 horse-power. Four tubular boilers 54 inches in diameter, 16 feet long, with 758 square feet of heating surface each, were provided; and although the water supply of the mill is not sufficient to use the condenser, two of these boilers only are in operation to furnish steam to run the entire mill, and this with a consumption of 9½ cords of wood per day of twenty-four hours. The Lexington Mill engines are the first striking instances of the introduction of the best steam engineering practice in silver mines. Their success will, we trust, mark the beginning of a new era, in which due attention is given to this important source of economy.

THE OILS OF THE JAMESON COKING PROCESS.

Mr. Watson Smith has apparently examined with care the oils condensed in saving the by-products in coking in the Jameson modification of the bee-hive oven. He reports:

The tar, as it was at first called, is now, I observe, termed "oils," and Jameson states that he obtains from six to fifteen gallons of tar per ton of coal coked. As to this tar, various reports have got abroad. In the *Journal of the Society of Chemical Industry*, it has been represented in one case as consisting merely of paraffines, liquid and solid, and in another, as containing no aromatic compounds applicable to the manufacture of colors. Now, neither of these statements is quite true, although in part so. Though benzine is quite absent in the Jameson tar, yet in admixture with paraffines, both very small quantities of toluene and larger quantities of xylene are present. I have obtained their nitro-products. Now benzine, toluene, and, I believe, xylene, are found in the Scottish shale spirit produced in the works of the Young Paraffine Light Company. This I proved as far back as 1868. But these aromatic hydrocarbons are mixed in the shale spirit with bodies of about the same vapor tension, belonging to the olefiant gas series, and the attempt to convert them into their corresponding nitro-derivatives results in the production of bodies yielding most acrid and pungent fumes, resembling those of acroleine. Besides rendering the operation of nitration intolerable, the arid bodies are not easily removed from the nitro-benzine and its homologues. But in the spirit from the Jameson oils, the bodies present belong to the marsh-gas series mainly, and hence the aromatic hydro-carbons present might be safely nitrated, and the paraffines afterward removed by steam from the crude nitro-product. The unfortunate circumstance is, that there is so little of this benzine series present, and the representative member (benzine) was quite absent from all samples I have yet examined.

Lubricating and Burning-Oils.—The chief bulk of the Jameson tar, having a specific gravity of 0·960, consists of oils boiling between 250 degrees and 350 degrees, from which on cooling no crystalline substance separates. These oils I have tested as regards their burning qualities in lamps, and as regards lubricating value, and I find them of little value for burning, and of but secondary value as lubricants. One singular feature about them is, that they are quite devoid of "blueness" or fluorescence. If these oils find their way into the market, I would give a timely warning to all those who are buyers of vegetable and animal oils, namely, cease to rely solely on the test of "blueness" or fluorescence of the oils you examine, as a proof of the presence in them of mineral oils!

Paraffine.—But a considerable proportion of oils distills over above 350 degrees, namely, from somewhere about 400 degrees to the point at which pitch remains in the retort, and these oils do separate paraffine scale, though not so much as could be desired, and the paraffine wax obtained has a high melting-point, namely, 58 degrees Cent. It is characteristic of the solid paraffine obtained (of course in small quantity) from certain normal coal-tars, especially those obtained from Wigan cannel, that this paraffine possesses a very high melting-point. The highest melting-point of the paraffine wax made by the Scottish shale distillers is about 52 degrees C.

Phenols.—If the crude oils boiling between 200 degrees and 300 degrees C. be treated with caustic soda lye, and the phenols extracted in the usual way, a fairly large proportion of a peculiar series of phenols of increasing boiling-points is obtained in the crude extract, certain of these phenols resembling the constituents of the creosote of wood-tar. A mere trace of carbolic acid was found, but more of the cresols, and by far the largest bulk of the constituents of the crude phenol distills at from 250 degrees to 300 degrees C. The latter fraction, boiling at about 300 degrees, is a resinous substance perfectly soluble in caustic soda, to which it communicates a red color.

Certain of these phenols yield blue and red colors with alkalis, but of no stability or value. These colored alkaline salts remind one of the colored salts of eupittonic acid, the phenol-like acid derived by the oxidation of Reichenbach's wood-tar pittacal.

Neither naphthalene nor anthracene is present even in traces in Jameson's coke-oven tar. The fact that the specific gravity of this tar is less than that of water is a circumstance sufficient of itself to indicate that it belongs to the class of tars obtained by the distillation of coal at lower temperatures. I think that Jameson's coke-oven tar offers a fine field of research to the scientific chemist, and that his labors *may* develop valuable fruit in a commercial sense, as well as for science; but I do not consider this tar at present, looking at its heterogeneous and unsatisfactory nature, a very inviting subject for present commercial speculation, in view of the possibility of getting the far more valuable real coal-tar as a coke-oven by-product, with its color-yielding and purely aromatic consitutents.

GEORGE WEBB.—Gen. George Webb, who died in Johnstown, Pa., October 9th, was born in Muncy, Lycoming County, Pa., November 4th, 1828. He taught school and educated himself in civil engineering. In 1850, he went to the lead mining district of Wisconsin. About 1852, he surveyed the northern boundary of that State for the government. The district was a vast wilderness, and he suffered great hardships. From 1856 to 1860, he was City Engineer of Dubuque, Iowa. In 1860, he negotiated with Jefferson Davis for the building of levees on the Mississippi, but, the war breaking out, he gave up all contracts and entered the Union army as captain of a company from Lycoming County. From 1862 to 1872, General Webb was Chief-Engineer and General Superintendent of the Catawissa Railroad, and lived in Williamsport during this time. He was also Chief-Engineer of the Baltimore & Potomac road, and constructed the large tunnel under Baltimore. In 1872, he was appointed Assistant General Manager of the Pittsburg, Cincinnati & St. Louis Railroad, and great credit has been given him in bringing that road to its present high standard. In 1874, he was appointed to the same position on the Pittsburg, Fort Wayne & Chicago Railroad. In 1875, he was appointed General Agent for the Cambria Iron Company. He had full control of all the tests of steel made by this company for the Brooklyn Bridge.

GOLD IN THE PROVINCE OF MINAS-GERAES, BRAZIL.

It was the discovery of gold which, according to Prof. A. de Bovet, of the Ouro-Preto School of Mines, first attracted people to the Province of Minas-Geraes in the beginning of the seventeenth century. Since then, it may be said that the working of gold ores has continued uninterruptedly, though with varying activity. Compared with what was done toward the close of the last century, this industry is to-day falling off, although this can not be attributed to the exhaustion of the deposits. They are far from being worked out. They may be classed under three general types, the pyrites veins, quartz veins, and itabirites. In the quartz veins, the mass of the deposit is quartz in which are found irregularly disseminated crystals of iron pyrites and particles of gold, generally coarse. Their richness is essentially irregular, while the pyrites found in them is also scattered irregularly and in pretty large crystals. In what has been called the pyrites veins, the mass of rock is formed of quartz and pyrites, the latter, however, predominating. The mixture is very fine, differing very much from the rock taken from the quartz vein. Arsenical pyrites forms the mass, iron pyrites being present only in small quantities. The gold in these veins is not found in scales or coarse grains, but in an extremely fine state; so that it is very difficult to pan out any gold. Instead of being irregularly disseminated in the mass, as in the quartz veins, the gold in this class of deposits is, on the contrary, distributed throughout, though with remarkable regularity; and the grade, though low, is approximately the same in different parts of the deposit. These veins are both true fissures clearly cutting through the country-rock, as at Morro-Velho, and as beds at Pary and at Passagem. Granites and gneiss form the lowest rocks of the province, above which lie schists, followed by quartzites and itabirites, which occur in two forms, as a solid rock, called "*pedra de ferro*," and a friable rock which has received the name of "*jacutinga*." The quartz veins are found both in the gneiss and later formations, while, so far as is known, the pyrites veins do not cut through the quartzites or the itabirites. The famous Morro-Velho vein cuts through the schists, while the bedded vein at Pary lies upon the gneiss. Where the veins have cut through or traversed permeable rocks, an impregnation of these rocks has taken place. This is not the case with the pyrites veins, which cut through the hard and compact schistose rocks. It holds good, however, for the quartz veins when passing through deposits of *jacutinga* and the hard quartzites, upon the cleavage surfaces of which gold is found. In the vicinity of Morro Prato, a considerable deposit of *jacutinga* has been worked by an open cut, wherever quartz veins have passed through it, the workings exending from 150 to 250 feet from the hanging and the foot-walls of the vein. The gold found in these deposits is coarse and very irregularly distributed. At some points, these itabirite beds have proved fabulously rich, while over a great extent they are absolutely barren. This class of deposits, it will be noted, is intimately connected with the quartz veins; still it is important enough because of the enormous development of the workings which it has given rise to, to consider it a third type of auriferous deposits. There seems little doubt that the gold in them has been derived from the quartz veins, its character being exactly the same, and being accompanied very frequently by pyrites. The quartzites, like those of Pary and Passagem, on the other hand, show a distribution of gold very similar to that of the Morro-Velho vein, for instance, and therefore it is probable that they have no connection with quartz fissure veins, but rather with pyrites veins.

As elsewhere, the alluvial deposits first attracted the attention of the miners and were rapidly exhausted. They were followed by the working of the itabirite beds; and it was only at a later date that the working of the vein deposits was begun. The large amount of capital required for such undertakings led to a transfer of operations from the hands of the native population to foreign companies, principally English organizations, which introduced new processes and worked with varying success. To-day, the few important mines working are in the hands of English companies, the Morro-Velho, Pary, and Morro de Santa Anna, and the total product of the province is little more than the combined yield of these enterprises. There are a few individuals who put up a small stamp-mill and work with a few men. They have not in view the working of their mines, but seem intent only upon holding their claims until the time may arrive when they can sell out to a foreign company. Generally, they have exorbitant ideas as to the value of their property, and this may account for their lack of enterprise. A description of gold mining in the province may therefore be limited to an account of the three great English companies already mentioned.

THE MORRO-VELHO WORKINGS.

The deposit worked at Morro-Velho is a pyrites vein, the ore being a close mixture of fine grains of quartz, arsenical pyrites, and iron pyrites, with occasional patches of copper pyrites, calcspar, and siderite. The vein, which is almost vertical, cuts through the schists, coursing from east to west. It is very narrow, but has a chute running down at an angle of forty-five degrees, with an average thickness of twenty-five feet and a length on the vein of 200 feet. It is this part of the vein which is worked. The first opening on the vein was abandoned on account of a fire in the timbering which led to caving. Under it, a sufficient thickness of ore was left to form a solid roof, and below it the workings were again taken up, being opened by two pits placed in the south wall of the vein. The workings are carried out without any headings or any gobbing, the whole of the ore being extracted and an open space left above. In this manner, an immense underground chamber has been left open 650 feet deep, 300 feet long, and 25 feet wide. Though the walls are solid, such an opening could naturally not be expected to stand, and therefore timbering on a grand scale is put in. In one year, six thousand cubic feet of timber were put into the mine. In this manner, it has been possible to reach a depth of 1900 feet. The water is pumped out with the aid of a wheel more than fifty feet in diameter, while the hoisting is done by a wheel of about the same dimensions. Dynamite is used for blasting, the holes being drilled by hand. Trials with rock drills have not, it is said, given satisfactory results. The total quantity of ore extracted in 1880 was 63,684 tons in 310 working days. The ore is first broken and sorted. It is then delivered to a stamp-mill and passed over buddles, the concentrates going directly to amalgamation. The

tailings are ground in arrastras, and, after going over a second set of buddles, yield concentrates for amalgamation and a large quantity of poor tailings. The larger part of the latter is carried off by the water and lost. A small quantity is retained to be worked when a practical process has been found to extract the little gold it contains. The concentrates are amalgamated in barrels, the amalgam being collected with mercury, while the tailings go to the buddles, the concentrates of which return to the barrels, while the tailings are taken to arrastras to be treated over again. There are 126 stamps, run by five wheels making from 56 to 67 drops a minute, and crushing per day 171 tons through a very fine sieve. The amalgamation is conducted in sixty Freiberg barrels, into which are charged from 1700 to 2000 pounds of ore and from 45 to 50 pounds of mercury. It takes twenty-four hours to complete a charge. The Morro-Velho ore is poor, the average being thirty grams per metric ton. Out of one lot of 162·5 tons, containing 4·8756 kilograms of gold, the first buddles under the stamps catch 3·604 kilograms in 9·144 tons of concentrates. Out of this, 3443 grams are obtained in the first amalgamation, and by the second working the rest is recovered, with the exception of 12 grams lost in the tailings. In the material from the first buddles and from the arrastra buddles, are obtained 160 tons of tailings containing 1420 grams of gold. Of this, a sufficient quantity is saved to reduce the loss to 25·4 per cent. Though this loss may be great, it is not high when it is considered how difficult it is to treat an ore in which the gold is in so fine a state that it is never visible to the naked eye, and can not be shown in the pan. It is very possible, besides, that a certain quantity is not in the metallic state and therefore escapes amalgamation. The Morro-Velho Company is continually carrying on experiments to extract the gold from tailings saved. Mr. De Bovet holds that it is not good practice to attempt to improve the yield by diverting attention exclusively to these tailings which only contain twelve grams per ton. He believes that it would be better to try to improve the other parts of the process, to direct the main efforts to the ore extracted from the mines, and not to the deposits of tailings. He advocates a closer classification for the buddles, and believes that roasting would facilitate the present operations. The labor question is one which is now seriously embarrassing the company, and coolies are to replace the slaves. In 1880, the profits of working 64,000 tons were £63,000 sterling, against £78,000 in 1879 and £103,000 in 1878, the dividends distributed in 1880 amounting to twenty-five per cent. In 1880, the mines employed 90 Europeans and 1211 Brazilians.

THE PARY WORKINGS.

The Santa Barbara Company is working at Pary a bed of iron pyrites, mispickel, and quartz, dipping at 45 degrees east, with a thickness of from 6½ to 8 feet. Its contents vary considerably. At some points, the vein seems divided in two parts, the upper being almost exclusively composed of quartz, hornblende, garnet, and mica, being barren and the lower part quartz and pyrites, containing gold and being similar to the Morro-Velho ore. At other points, the two rocks are mixed from the foot-wall to the hanging-wall. The deposit crops out on the side of the hill on the left bank of the Rio San Francisco, and at a few feet above the level of the river a long tunnel has been driven in. Above the level of this tunnel, all the ore has been removed, and the workings now are below it. The mine makes a little water, which is easily pumped out. The ore is broken and sorted by women, and the pyrites sent to stamps driven by water-power. There are four mills having an aggregate of 51 stamps, crushing per day about 38 tons of ore. The pulp is run over buddles, and is amalgamated in Freiberg barrels, yielding about 12½ grams of gold per ton. The average grade of the rock does not seem to be known. Work at these mines is considerably hampered by lack of water, and it is the intention of the company to provide it by a long ditch.

THE MORRO DE SANTA ANNA WORKINGS.

The workings of the Don Pedro North Del Rey Company are in a deposit of *jacutinga* of a very friable character, so that it is not necessary to crush it. The gold is irregularly disseminated, being in small grains. It seems to occur in pockets of great richness, which are, however, limited in extent. There appears to be no system whatever in the workings, which are simply a blind groping after the rich streaks. The only guide is the pan, samples being taken repeatedly each day from the workings, which are tested by panning. The mine naturally requires very extensive timbering, and the quantity of water is very large, while on the other hand, the power available is limited. In spite of the expense which these conditions entail, work has been going on with varied success, passing through extraordinary returns which are out of proportion to the yield for such an ore as the Morro-Velho. These bonanzas are followed by times of absolute failure, and it is a crisis of this kind that the mine is now passing through. The greatest difficulty encountered is the question of drainage. Formerly, the pumps were worked by a water-wheel, and when increasing depth made this means insufficient, another method had to be sought for. Only a small quantity of water for power was available, but it is under a high head. Therefore, a large iron wheel, sixty feet in diameter, was put up. The mine is opened by a long tunnel, ending in two inclined planes dipping at 28 degrees. Into one of these planes, the pump-rods were put in. This rod from the wheel to the pumps is in all 4560 feet long and weighs 45 tons. The cost of this enormous mass of iron brought from England may be imagined. Whether it was that the axle of the wheel was too weak or its spokes poorly attached, it was found that it would not work, and after a few attempts it had to be stopped and the mine was drowned out.

FURNACE, MILL AND FACTORY.

The Pratt Coal and Iron Company was organized at Birmingham, Ala., last week, by the consolidation of the Pratt Coal and Coke Company and the Birmingham Coal, Coke, and Iron Company. The new company takes possession of all the property of the concerns of which it is the successor, assuming their liabilities. The lands comprise about 75,000 acres, of which one half, that belonging to the Birmingham Company, is undeveloped. The paid-in capital of the new concern is $1,500,000. The following officers were elected at a recent meeting: Enoch Ensley, President; J. C. Neely, Vice-President; J. H. Smith, Secretary; J. C. Radcliffe, Treasurer; and W. L. Gude, Superintendent. It is believed that the proposed issue of $800,000 of bonds, which the stockholders will consider at their meeting on the 1st of November, is for the purpose of providing funds for building blast-furnaces near Birmingham.

T. C. Snyder & Co., manufacturers of iron roofing, at Canton, O., report increasing business. This firm is now manufacturing what is known as "calamined iron." The sheets are coated by a new patent process, which causes the iron to become coated with a material that is said to withstand sulphuric acid and all deleterious substances, and also solders better than tin or galvanized iron. The finished calamined iron resembles galvanized iron, and is said to be indestructible.

The Arizona Copper Company, owning the Clifton and Longfellow mines, Clifton, Arizona, has ordered of Fraser & Chalmers the following machinery: Three furnaces, 42 inches diameter, with all slag-pots, carriages, and bullion-pots. Three No. 6 Baker blowers. One No. "C" Comet crusher. Two Blake crushers. Three Leffel water-wheels. One upright boiler. Stillwell & Bierce heater and lime-catcher, pump, car irons, scales, furnace tools, roofing, iron blast gates and pipes. Two tubular steam-boilers, 60 inches by 16 feet, and accompanying machinery, amounting in all to about seventeen car-loads.

The Lackawanna Iron Company has started a remodeled spiegel furnace at Newark, which is doing excellent work. They closed the top and the front, and put in a Cooper stove which carries the blast up to 920 degrees at the stove. They blow through five 2¾-inch tuyeres and one small one above the front, the pressure of blast ranging between 6½ and 7½ pounds. The furnace is 34½ feet high and 8-foot bosh. Formerly, in blowing in, the furnace would make gray iron the first few days, not coming up to the regular grade of spiegel until the eighth day. With the remodeled furnace, spiegel was produced at the very start, and came up to 20 per cent metal on the third day. They get more gas and more oxide of zinc, approximately 15 per cent of the weight of the pig. The production now is eight tons per day, and it is expected that when running full it will average ten tons, against 7½ tons formerly. Mr. G. C. Stone has charge of the furnace.

The Jefferson Iron-Works, at Steubenville, which have been making extensive repairs about the mill, factory, and furnace the past three months, have resumed operations.

The Saucon Iron Company has closed its iron mines, and will blow out its furnaces. Low prices are said to be the cause of the suspension.

The rolling-mill of the Hollidaysburg Iron and Nail Company, which has been idle for about two months, is now running on full-time. The mill was thoroughly repaired during the suspension.

The Chicago Automatic Steam-Engine Manufacturing Company has lately been organized, with a capital of $300,000, by Lyman E. De Wolf, John V. Colby, and Dennis O. B. Ladd.

The Bridgeport Brass Company, Bridgeport, Conn., is erecting a new factory 150 by 35 feet, three stories, and built of brick. This building is erected to accommodate the increasing business in the manufacture of electric light and telegraph wires.

Col. A. H. Leftwich has purchased the James River Iron-Works, four miles above Lynchburg, Va., for $75,000. He will turn the same into a nail factory. It is valuable property, and cost originally $296,000. It has not been worked for several years.

The Ordnance Bureau of the War Department has made a contract with the South Boston Iron Company for the manufacture of one of the Yates heavy rifle cannon for experimental purposes.

The Catasauqua *Dispatch* reports that the new blast-engines at the Crane Iron-Works have been tested and found to work well. The erection is not yet completed. The blast-engines of the company are repainting and getting in good order. The fire some years ago in No. 8 engine-house destroyed the wooden platforms, and when it was rebuilt, they were abandoned altogether. It has been found necessary to rebuild them, for the better security of the walls.

The Steelton *Reporter* states that the rail-mill for the month of September rolled 14,318 tons of steel rails of various patterns, being an increase of 3472 tons over the corresponding month of 1882. The production last week was 3619 tons of steel rails. The Bessemer mill last week produced 4436 tons of steel ingots. The tonnage for the month of September in the Bessemer mill was 17,210 tons, being an increase of 2152 tons over the corresponding month last year. The blooming mill cut out during the month of September 15,853 tons of blooms. The merchant mill will be put in operation as soon as the engines are completed. The engine on the lower train of rolls has been running all the week testing the rolls, which have been found to be in perfect order. The frog, switch, and interlocking department is running night and day to fill orders on hand and those constantly arriving. No. 5 furnace is again in full blast, and lately made the largest production in the history of the furnace.

The Pittsburg Bessemer Steel-Works, located at Homestead, Pa., were sold October 16th to Carnegie Brothers & Co., of the Edgar Thomson Steel Company. The basis of the sale is said to be $1,200,000.

The Union Steel Company has been incorporated at Springfield, Ill., with a capital stock of $4,600,000. This is the company organized to purchase the plant of the Union Iron and Steel Company. The date for the resumption of work at the mills is still indefinite.

The announcement is made officially by the Thomas Iron Company, of Hokendauqua, that two of its furnaces at Columbia have been blown out and two at Hokendauqua; in addition, two already idle will be blown out shortly. Another furnace at Hokendauqua, which has been in blast for five years, will probably be blown out soon.

It is rumored that the Allentown Iron Company will blow out its last working furnace.

The Cincinnati Cooperage Company has placed its order with the Lechner Manufacturing Company, Columbus, O., for chain conveyers, to be used at its works at Cincinnati, O. This company has also received orders for chain belting from the Colorado Machinery Company, South Pueblo, Colo.; F. W. Schroeder, Roca, Neb.; C. C. Warren, Waterbury, Vt.; and others, to be used for conveyers and driving purposes.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

PRESCOTT DISTRICT.

Grand Gulch Mining Company, Adams lode.

TUCSON DISTRICT.

Oro Blanco Mining Company, Louise, Franco-American, and Normand lodes.

CALIFORNIA.

SACRAMENTO DISTRICT.

John Carre, Leahy & Riley placer. Alexander Wylie *et al.*, Mountain Ranch placer.

SHASTA DISTRICT.

Michael Smith, placer.

STOCKTON DISTRICT.

Antonio Gianelli, placer. Thomas Poyzer, Hite Central gold quartz mine and mill-site.

SUSANVILLE DISTRICT.

A. E. Leavitt *et al.*, Elizabeth Town Flat placer.

COLORADO.

CENTRAL CITY DISTRICT.

George Darsie *et al.*, California lode. William A. Brown, California, Montana, and Brown lodes. Republic Gold Mining Company, Pewabic lode. Gray War-

ner, Waterloo lode. J. D. Armstrong, Mendick lode. Marcus W. Rasbach, General Herkimer lode and mill-site and Herkimer lode. David B. Anderson, Champion lode. William J. Barker, Peck lode. Charles H. Dugliss, Mastodon lode. Ernest Stahl *et al.*, Lac la Belle Tunnel No. 1. J. E. Benjamin *et al.*, Cape Cod Tunnel lode No. 1. Jacob Kisthard *et al.*, Little Willie lode. Conara Silver Mining Company, Tunnel No. 1. Jacob Burnet *et al.*, Badger State lode. Leonard A. Watkins, Commonwealth lode. J. V. W. Vanderburgh, Pratt lode and mill-site.

DURANGO DISTRICT.

Pride of the West Consolidated Mining Company, Richmond lode and mill-site Tower Mountain Mining Company, Rowell lode. Robert Dremon *et al.*, Paymaster lode.

LAKE CITY DISTRICT.

W. Weston *et al.*, Declaration lode and mill-site. Hugh J. Alexander *et al.*, Golden Fleece lode. Emma Mountain Mining Company, Sidney lode. Benjamin F. McKenzie, Great Republican lode. John M. Cooper, Chrysolite lode. Mary J. Lee, Ajax lode and mill-site. Marshall Basin Mining Company, Argentine No. 1 lode and mill-site. W. W. Roof *et al.*, Ida May lode. Robert Crooke *et al.*, Will Crooke lode.

LEADVILLE DISTRICT.

William H. Lovell *et al.*, Bush Lode. Continental Gold and Silver Mining Company *et al.*, Bijou and Golden Queen lodes. Continental Gold and Silver Mining Company, Central lode. Bullion Consolidated Mining Company, Baltic and Condor lodes and mill-sites. Bullion Consolidated Mining Company *et al.*, Lottie lode. W. G. Richardson, Little Lottie lode. F. B. Keyes *et al.*, N. K. Carlton lode. Consolidated Gold and Silver Mining Company, Juliana lode. W. A. Kester *et al.*, Comstock lode. Henry D. Bates *et al.*, Richmond lode. D. D. Belden *et al.*, Jenny Lind lode. F. H. Ketcham, Comstock lode. Clifton Consolidated Mining Company. Clifton lode. Townsend Webster, Imperial lode. John R. Knodel *et al.*, Mamie R. lode. J. K. McDonald, Kremlin lode. Fryer Hill Mining Company. Virginius lode. Mary A. Cummings *et al.*, Rough & Ready lode. John A. Willard, Ontario lode. J. R. Long *et al.*, Battle Mountain lode. John H. Skillman *et al.*, Golden Terra lode. James B. McDonald, Chelsea lode. Jacob E. Rice, Houston lode. A. H. Bereman, Louisa and Columbia lodes. Little Delaware Consolidated Mining Company, Little Delaware lode and McAllister mill-site. John Mattson, Mattson lode.

PUEBLO DISTRICT.

Louis Wahl, Terrible lode and mill-site. Christian Wahl, Mammoth lode and mill-site. Christian Wahl *et al.*, Horn-Silver lode and mill-site, and Chlor Silver lode.

DAKOTA.

DEADWOOD DISTRICT.

Cashier Gold Mining Company, Cashier lode.

MONTANA.

HELENA DISTRICT.

John Reed *et al.*, Keystone lode. Clara L. Hathaway, Clara Hathaway lode. Clara Kennedy, Little Emma and Marietta lodes. James R. Clark, Mountain Boy lode. Patrick Conlon, Corona lode. Charles E. Colbert *et al.*, placer. Benjamin F. Horsum *et al.*, placer.

NEVADA.

EUREKA DISTRICT.

George W. Lamoureaux *et al.*, Carbonate lode and mill-site.

OREGON.

LA GRANDE DISTRICT.

E. W. Webster *et al.*, placer. Michael Hyde, Michael Hyde quartz mine.

UTAH.

SALT LAKE CITY DISTRICT.

Climax Consolidated Mining Company, James A. Garfield lode. Thomas Cupit *et al.*, Fourth of July No. 2, Silver Age, and Golden Age lodes. James Watson, coal. Joseph M. Watson, coal. Henry Wood, coal. Joseph H. Jennings, Carrie lode and Carrie mill-site. Charles C. Woodhouse *et al.*, Cortes lode. Morton French, Osceola lode. Richmond & Teresa Mining Company, Teresa lode.

WASHINGTON.

OLYMPIA DISTRICT.

Ahio Watt, coal.

GENERAL MINING NEWS.

ARIZONA.

Governor Tritle, in his report on the progress and development of the territory, says that the territory can now claim a population of 75,000 people and the possession of over $20,000,000 in taxable property. The dangerous and disturbing elements which have been factors in checking progress are now well under control. In the last two years, exceptional development has been made in all industries, mining, grazing, and agricultural. Extensive railroad enterprises have been completed, and the affairs of the territory are in an exceedingly prosperous condition. The value of the gold and silver product for the year ended December 31st, 1883, is placed at $9,298,267, against $8,198,766 in 1881. A large quantity of rich ore and base bullion, which is estimated to amount to at least 10 per cent of the figures given, is not included in this valuation. The yield of copper in 1882 was about 15,000,000 pounds. The combined value of the silver and copper product for 1883 will be between $15,000,000 and $16,000,000.

COCHISE COUNTY—TOMBSTONE DISTRICT.

DEAN RICHMOND.—Work will be resumed shortly. A contract is to be made with the Woronoco Smelting Company.

EMPIRE.—Work has been resumed.

GIRARD.—At the 200-foot level, a four-foot body of fine chloride ore has been encountered, and a large quantity of fine-grade ore is hoisting to the surface. From a series of assays made, it appears that the averages were $200 in silver. At the 300-foot level, the ores are sulphurets, but equal in richness to those in the upper level.

GILA COUNTY.

OLD DOMINION.—Superintendent Thomas, of this company, at Globe, reports the August product from one of the Rankin, Brayton & Co.'s 30-ton smelters to be 403,810 pounds, an average daily yield of 13,460 pounds, bullion running 99 per cent.

PINAL COUNTY.

RAY COPPER.—Under date of October 9th, J. M. Haskell writes to Mr. L. Zeckendorf, secretary and treasurer of the company, as follows: I visited the Ray Copper Company's property on the first instant, and remained there some days. I was very much pleased with the developments. There have been 500 feet or more of tunnel, winzes, and drifts run since my last visit, and nearly every foot in ore, native copper, carbonate, glance, and oxides. There is a large amount now in sight, enough to run a year or more, with good reduction-works, to say nothing about the rest of the properties where there are thousands of tons that will work in with the Ray ores. I also, while there, tested thoroughly the carbonate ore and native copper, both sheet and shot, and the concentrations were very satisfactory indeed, settling much better than I expected. There need be but a very little loss in concentrating—in fact, nearly nothing—and it will be possible to run the grade well up, say from 20 to 90 per cent. The native copper you can either melt or ship, as you may elect. I recommend starting a new shaft, which will, when down 50 or 100 feet, cut the vein where I believe it will expose a larger and better body of ore than yet found in the mine, and also will answer for the main working-shaft for at least 400 feet in depth. The property now is a settled fact. You can order concentrating-works and put your furnace in repair. The property will pay good dividends, when once the reduction-works are fairly running.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The men are taking up the pump-column at the Lent shaft at the 1000-foot level, and a number of men have been discharged. For two or three months, the Bodie and Standard people have been negotiating with the view of sinking the Lent 200 feet deeper, and prospecting both mines on a level from it. This would give the Standard a depth of 1440 feet, and the Lent 1200 feet, the collar of the Lent being 240 feet lower than the Standard. A division of the expense would have made it comparatively light for each company, and, in fact, it would seem to be as sensible and economical a proposition as could be made. For some reason, says the Bodie *Free Press*, the plan seems, for the present at least, to have fallen through. The stopping of work on the 1000-foot level of the Bodie will not affect the extraction and milling of ore, as the latter is taken from above the 800 level. The ore for a week or two back has been of better quality than heretofore, and the bullion shipments have been larger. The appearance of the mine generally is better than it has been for some time back.

NEVADA COUNTY.

IDAHO.—The average output of ore is about 100 tons a day. The results of the working of the ore are entirely satisfactory.

EMPIRE.—The output continues steady and profitable. The mine gives employment in all its departments to 200 men. Outside of these, there are working in various parts of the drifts of the mine, and at the surface on small veins or feeders to the main vein, some thirty men as tributers.

CANADA.

PROVINCE OF ONTARIO.

A number of prospectors are at work in the county of Ottawa searching for galena deposits. Several very rich deposits of this ore have been recently found in this district.

COLORADO.

CHAFFEE COUNTY.

ALPINE SMELTER.—The smelter is about ready to blow in, and is already contracting for ore. Concentrating machinery and amalgamation tables will be added to the present plant.

CLEAR CREEK COUNTY.

CORRY CITY.—In driving the tunnel level west of the shaft, a streak of iron ore several inches wide was exposed which assays from 99 to 105 ounces in silver per ton. Seventy-five feet down the shaft, a cross-cut has been run eleven feet south toward the foot-wall, and is all concentrating material, which runs from 11 to 172 ounces. There is a three-inch streak in it which mill-runs over 100 ounces.

FREELAND MINING AND MILLING COMPANY.—The company has purchased the Dumont smelter, situated at Freeland. The company will not enter into possession before January 1st, 1884, previous to which a general clean-up will be made, and the works put in perfect repair. Alterations will be made and improvements added. It has already proved itself perfectly adapted to the smelting of the ores from the Freeland mine.

KOHINOOR & DONALDSON.—Five car-loads of machinery for the mill at the mouth of Fall River have been received. The machinery is in process of removal to that place, and will be put in operation as soon as possible. This mill, when completed, will be one of the largest in this part of the State.

PAY ROCK.—The mill is now running steadily double shift, and is consuming about thirty tons of dirt daily. The supply of water is sufficient, and the mill will probably run all winter.

DOLORES COUNTY.

LITTLE MAGGIE.—A shaft was started 120 feet from the mouth of the tunnel, and has been sunk 30 feet, in which distance 65 tons of first-class ore have been taken out and shipped to the Grand View smelter. This ore runs 68 ounces in silver and 40 per cent in lead. An equal amount of ore of lower grade has been reserved from this working, making 130 tons of ore from a shaft 30 feet deep. At the bottom of this shaft, a chamber has been cut, showing the vein to be 18 feet wide, with a solid ore-body 12 feet wide.

GILPIN COUNTY.

LITTLE EDDIE.—Drifts are extending east and west from the main shaft at a depth of 45 feet. The west drift is passing through quite an extensive body of ore, milling and smelting, the former varying in its yield from 2½ to 6½ ounces gold per cord, the average being 4 ounces. The smelting ore nets $40 per ton.

REPUBLIC.—The company's 25-stamp mill is well supplied with ore from the Pewabic mine, and is kept running steadily.

LAKE COUNTY.

CHRYSOLITE.—The new double-plunger Cameron steam-pump for the Iron incline has been received and put in position. The capacity is estimated at from 250 to 300 gallons a minute.

CUMMINGS & FINN.—Grant & Company will assume possession of this smelter November 5th.

DUNKIN.—The following statement, taken from the books of the company, shows the product of the mine from January 1st, 1883, to October 1st, $42,959; expenses during the same period, $18,047; profits, $24,912. Dividend paid, $10,000. Cash on hand October 1st, 1883, in New York, $6771; in Leadville, $8529. Total cash on hand October 1st, $15,300. The product of September amounted to $6113.29; the expenses to $2194.32.

FIRST NATIONAL MILL.—This concentrating mill, situated in Iowa Gulch, has been leased and will be started up.

HARRISON.—The new roasting-kilns recently erected at the works are partially completed and several of the stalls will be fired at once. The compartments are about ten feet square and six feet deep, erected in two parallel rows, with a flue between them, connecting with a stack 60 feet in hight. The compartments number sixteen or twenty. The ore to be roasted in these kilns is the sulphide mineral now produced by the Colonel Sellers and other mines of California Gulch. Quite a lot of this ore was found on the ground, which averages about forty per cent in sulphur. A layer of wood about twelve inches in depth, it is estimated, will start the sulphur in the ores to burning, and when this is once accomplished, the process will continue until completed.

IRON HILL CONSOLIDATED.—The mines during the month of September shipped 950 tons of ore. The product of the mines has shown a marked improvement in the average value per ton. The mines are all looking well. The new hoisting machinery for the Imes shaft is all in place and in working order. The shaft has reached a depth of 600 feet, penetrating the underlying limestone 200 feet. The intentions are to begin work at this shaft by drifting from the 400-foot level. It is at this station that a line of contact between the porphyry and limestone was intersected. The further exploration of the lower lime strata will, however, not be deferred any great length of time, and at an early day a pump is to be added to the plant, and the shaft, now containing considerable water, is to be cleared,

and sunk to greater depth, and levels driven on the mineralized seams already disclosed.

LITTLE PITTSBURG.—Work is to be started up immediately on No. 10 shaft of the Little Pittsburg claim.

LITTLE SLIVER.—The mine is worked principally with a view to exploration and development, and as a consequence the output is very light.

LUZERNE.—An important strike was made recently in this lode. The ore consists of sand and hard carbonates, and ocher, and to all appearances will prove very rich in silver, in addition to carrying an appreciable amount of lead. The location is isolated from working mines, being about midway between the Henriett and Chrysolite and Little Pittsburg mines, and opens up a section of territory heretofore universally condemned. The possibilities presented are therefore great, and it would not be surprising if this discovery led to the development of an ore-chute that will prove a great bonanza. The shaft has a depth of 175 feet, and was sunk to within a few feet of the ore-body last year, when the owners ran out of funds, and were forced to suspend work.

ROBERT E. LEE.—The mine is working from thirty to forty men, and shipping from twenty to thirty tons of ore a day, in addition to the shipment of dump material to the Leadville Gold and Silver Mining Company's mill. The general range of the ore is from 60 to 300 ounces to the ton, while small lots have been shipped assaying as high as 2200 ounces in silver. The first, second, and third-class ores are sold to the smelters, who work them in with the lead ores and the low-grade material to stamp-mills.

SILVER CORD.—During the month of September, the mine shipped 3700 tons of ore. The output of the mine has not yet been completely settled for, but sufficient is known to show an appreciable deterioration in the grade of ore. The mine is producing its customary amount. So states the Leadville *Herald*.

RED MOUNTAIN DISTRICT.

The mines and prospects situated along Lake Creek, above Twin Lakes, are doing well. A number of properties are shipping regularly, and several mills in this section are kept employed steadily. The ten-stamp mill at Everett's is running on Forest Queen ore, and is doing satisfactory work.

Among the mines working is the Lucky Strike, which is having the assessment-work done, and is looking much better than last year, when the annual work yielded a ton of ore running 473 ounces in silver. The vein is two feet in width, and is situated on Mount Ewing.

The Jeannette mine is worked, and is producing some fair ore, that is shipped. A cross-cut tunnel is driving by the Jack Pot lode.

PARK COUNTY.

SOVEREIGN.—This property is situated on the eastern slope of North Star Mountain, and embraces four locations aggregating 6000 feet on the old Harrington vein. This lode attracted attention twenty years ago, and its large production and unusual wealth soon collected about it a large number of the early miners, forming the town of Montgomery. The vein has a width of from four to ten feet, is very regular, and possesses fine walls. Its course is nearly north and south, with a dip to the westward of about 75 degrees. The oxidation of the mineral extends from 25 to 35 feet below grass-roots, where the ores in their original condition are found. Below this line, the vein-matrix consists of copper and iron pyrites and quartz carrying gold and silver in profitable quantities. The ore is reported to range in value from $50 to $150 per ton. The development of the mine aggregates about 4000 linear feet of tunneling and shafting, thoroughly demonstrating the strength and permanency of the lead. Several of the tunnels have been driven in on the vein from 200 to 300 feet, the deepest showing a solid breast of mineral four feet in width, that numerous assays have proved to be worth about one hundred dollars per ton. Another tunnel shows three feet of solid ore, while other openings show from twenty to thirty inches of excellent pay mineral. The lower tunnel is in 306 feet, and will be continued until a length of 2500 feet is attained, which will open the vein 800 feet below the outcrop and highest workings. The operations of the mine being confined to opening it for a future production, the yield so far has been light. The dumps, it is estimated, have 3000 tons of pay-ore, to which additions are made daily as development-work advances. The shipments during the past season have been limited to small quantities of free-milling ore. Thirty days' work on this class of material, treated at a quartz-mill, yielded 360 ounces of gold, worth nearly $7000.

SUMMIT COUNTY.

HORN-SILVER.—A large body of high-grade mineral has been struck.

DAKOTA.

FATHER DE SMET.—The superintendent reports October 1st: At the mine, work is going along as well as usual, with no important changes to note in any of the ore-breasts. The Golden Gate south header shows up as well as ever; the face is all in ore that samples from $5 to $7. We begin breasting out across the ledge to-day. East cross-cut, third level, is making very good progress, and ought to strike the ledge soon. The face is still in slate, mixed up with small stringers of quartz, but of not much value as yet. The report for the week ended October 7th shows: Ore extracted from first level, 900 tons; second level, 700 tons; third level, 375 tons. Ore milled, 1975 tons. The Golden Gate east cross-cut, third level, is 86 feet, and the Golden Gate south header, second level, is in 58 feet. The superintendent writes October 4th, as follows: I herewith inclose Express Co.'s receipt for bar No. 168, containing 1189·65 ounces gold, the result of the clean-up of the mill for the last half of September. This makes a total of 1947·35 ounces for the month. I am afraid it will be impossible to keep these figures up right along, but will do the best we can and make the best showing possible. At the mine, every thing is about the same as usual. The faces of both cross-cuts and south header show no change since last report.

KING SOLOMON.—The personal property has been sold at Tigerville. The Black Hills *Index* says that this is the result of bad management.

IDAHO.

The *Times* reports that the current season on Wood River has been one of great activity, and the consequent results are becoming apparent in the increased yield of the mines. Notwithstanding the late date of the completion of the railroad to Hailey, and the corresponding resumption of active operations, the yield of the mines, concentrating-works, mills, and smelters, will be large, and, when the many obstacles that had to be overcome are considered, eminently satisfactory. The aggregate yield of the Wood River and Sawtooth region this summer will probably not fall short of $5,000,000.

BAVARIAN.—Some ore treated showed 90 ounces silver and 75 per cent lead. The vein of this recently discovered mine is about two feet wide.

COLUMBIA & BEAVER.—The second shipment since starting up the mill has been made.

DAVITT.—This mine has yielded $45,000 since the end of last April, when the company resumed work. Within the past three weeks, a new shaft was started on a vein entirely distinct from the Davitt. This shaft is down 50 feet, in ore all the way, which shows widest at the bottom, where a drift that is in 25 feet from the shaft shows the vein to widen all the way out, until it gets to be fully two feet wide in the face of the drift. This new vein or ledge can be traced on the surface for 800 feet.

MAYFLOWER.—The Salt Lake smelters have purchased 100 tons, and an arrangement for the sale of all the product of the mine has been concluded with the agent of the Kansas City Reduction-Works. As soon as that contract is ratified by the company, the shipments of Mayflower ore (which have been suspended since the Ketchum Works refused to buy any more of it at the rates then ruling) will be resumed.

MULDOON.—The mine has been shut down for the winter.

SILVER KING.—About $40,000 were produced in two months.

MEXICO.

A correspondent of the Mexican *Financier* speaks of mines along the Pacific coast between Alamos and Mazatlan as follows: Near Alamos, there are the Minas Nuevas, run by an American firm, which employs 150 men, works 10 stamps, a concentrator and roasting-furnace, beating apparatus, smelting-furnace, and refining furnace. From Agiobampo, distant 170 miles, freights rule from $2.75 to $5 a carga. From Mazatlan to Agiobampo, freights are $10 a ton by schooner; and from Guaymas to Agiobampo, $8 a ton. Also in this district, within six miles of Alamos, four mines are working a large force, and three in Aduana.

The Promentorio mine has a 30-stamp mill, a 30-ton water-jacket smelter, and employs about 500 men.

At Pochibampo, no mines are actively worked now; but as soon as cheap transportation is afforded, several veins of low-grade and rebellious ores will be available.

At Techibampo, a number of mines have steadily been working for three years. The best ores have been shipped to Europe at a great expense, the cost of hauling to Agiobampo being about $35 a ton, and in little schooners from there to Mazatlan, $10 a ton.

At Roricarichi, are extensive silver mines which ship 300 or 400 tons a year to England of picked ores. It costs $50 a ton to haul or pack this ore to Agiobampo, or $4 a carga to the reduction-works at Minas Nuevas. At these mines, they leave about ten tons of low-grade ore on the dumps for every ton of ore they ship.

At Chinipas, there are a number of low-grade mines, which are now useless on account of the high rates of freights.

At San Agustin, there are two very important mines not now worked because the owners have not the means to put in the machinery required.

At Talmarapa, there are about 1000 men working on high-grade ore, with 14 stamps now running, and more going in.

The Hurapa mines are equally important. They have ten stamps now running by water-power, and will soon have twenty more worked by steam.

In the State of Sinaloa, is the Cosalá District, one of the largest in all Mexico. Some of its magnificent mines have been worked for many years, and are still as promising as ever. The Estacata mine had a vein of three inches on the surface. It gradually widened and increased until, at the depth of 400 feet, a bonanza was struck, not so rich, yielding $200 a ton. This was about 50 feet wide and 300 deep, when it became narrower and tapered into the original width of the vein. A second bonanza was struck at a much lower depth, 30 feet wide of continuous ore, averaging $250 a ton. Thirty stamps are employed. There is a group of old mines, the Mammoth, Realito, La Estrella, Mina del Agua, and Bufa, worked by a San Francisco company, the Mexican Mining and Real Estate Company of Sinaloa. The Mammoth opens into a large body of quartz. Two shafts have been sunk 200 feet deep and 120 apart, with rich rock on all sides, averaging $80 a ton.

The Realito is on the side of a mountain, reaching a vein three feet wide by a tunnel 500 feet above the arroya. The mineral assays run high. La Estrella dips at an angle of 45 degrees, is about 65 feet wide, assays average $175. The Bufa and Del Agua are also valuable properties. The company working these mines has large reduction-works and a large estate in lands, about 80,000 acres.

The Golconda mine, of the Cosalá District, is a large body of fine gold quartz, easy of reduction, and worked by the usual process. The ore at a depth of 120 feet assays $300 a ton. Several shafts have been sunk from 300 to 500 feet apart, each striking the same lode and the same body of ore. This mine is situated on the Cosalá River, a tributary of the Flota, and within a mile and a half of the valley of Cosalá.

The Nuestra Señora is another old and celebrated mine which has produced millions.

The Barretras mine built up the town of Cosalá and was founded on its tributes.

Northeastwardly from Culiacan is the Guadalupe and Calvo District, with rich mines all around, among them the Yedras, owned by Clarence King's company, with 40 stamps and consuming from 5 to 8 tons of salt daily. The Guadalupe and Calvo mine, with ten stamps, takes three quarters of a ton of salt a day to work 15 tons of ore. The Mineral del Cuerro ore is free-milling.

At Galiana, several companies have recently been organized. The Aldana mine is now opening up, and the natives work scores of mines in a small way by arrastras. From this group, conductas charge one per cent for taking ore to Parral or Culiacan.

TLALPUJAHUA DISTRICT.

BORDA.—At this mine, they are making a new start at the northern end, and will cut the main vein at a depth of 50 or 60 yards.

CONCEPCION.—The July product of the mine was 7000 ounces of silver; in August, it increased to 13,247 ounces. The mine is producing from 250 to 300 cargas a week, there being 300 pounds to the carga. Up to June, the work cost at the rate of from $8 to $10 a carga. In July, it cost $4.25 a carga; in August, it cost, up to the 22d, $3.15 a carga; and the last week of August the cost was reduced to $2.85. It is thought that the cost can be reduced to as low as $1 a carga. The present cost of milling is $8.10 a ton of 2000 pounds, that is, with the small five stamps and three barrels now running; but if they had 50 stamps, the milling could be done for $4 or $5 a ton. The average of ore is 67 ounces to the ton, but the select ores go as high as $1800 to the ton, and very small amounts, $4000 or $5000 a ton. The actual depth of the mine, although it is an old one, is only 225 feet. The main vein is 8 feet wide. If the mine were worked with hoisting machinery and all kinds of improvements, the ore could be taken out at $2 a ton; but by having peones to carry it out on their backs, it costs four times as much, and of course low-grade ore can not be worked profitably.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—The following statement shows the production from January 1st to August 31st:

Month.	Pounds lead.	Ounces silver.	Ounces gold.	Value in dollars.
January	419,416	41,651·80	2·293	$54,310.46
February	394,618	38,327·12	1·171	59,562.60
March	401,194	40,229·35	9·462	63,396.02
April	403,275	35,344·27	2·032	56,711.91
May	405,749	38,550·23	8·088	61,470.05
June	533,300	56,531·93	2·022	85,521.42
July	531,551	55,524·01	1·767	84,284.50
August	458,149	55,421·47	2·128	81,089.57
	3,549,252	361,580·18	29 963	$556,348.53

GALLATIN COUNTY—NEW WORLD MINING DISTRICT.

The district is situated at the head of Clark's Fork, bordering Wyoming, on the western spur of the Bear Tooth Mountains. The mineral belt is about eight miles wide, extending from the western slope of Miller to the eastern slope of the Henderson Mountains, and fifteen miles long, running from the Wyoming line, on the south, to Lake Providence, on the north. The veins are numerous, strong, and well defined in a porphyry and slate formation, trending north and

south, and bearing rich tetrahedral and cube galena ores. The country abounds in iron and lime for fluxing purposes.

REPUBLIC.—This company is the only one in operation. It is erecting concentrators and smelters with a capacity of 100 tons per day. The company owns several valuable claims which are thoroughly prospected, showing sufficient ore in sight to keep the works running for a limited number of years, and from tests made will yield from 55 to 60 ounces in silver and from 45 to 50 per cent lead.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA COMPANY.—The machinery for the additional works at the Gloster is now shipping. By the addition to the plant of sixty stamps, the company will have the pan amalgamating principle which has proved profitable in the gold mines of California. The machinery of twenty-four pans and twelve settlers is constructing by the Union Iron-Works, of San Francisco.

SILVER BOW COUNTY.

ALICE.—In the 100-foot level, the stopes are in a body of black sulphurets, which break off from the ledge in blocks and work and mill easily. The ore assays from 120 to 130 ounces. The west drift from the 800 has advanced 125 feet from the bottom of the winze, and the stopes are in 78-ounce ore. Prospecting is vigorously prosecuted at the face of the drift, to develop the extent and value of the vein. So far as developed, the ore-body in the lower level has been very satisfactory. The rock is fine-grained and carries less base than the ore from the upper levels, and, like the south vein, there is a great improvement in the quality of the ore as depth is attained.

ANACONDA.—The Dexter mill is running on free-milling ore from the Anaconda dump and running through 25 tons per day. The ore is from the waste-dump, and after sorting, produces from 14 to 16 ounces to the ton, which is worked at a profit under the improved appliances in use at the Dexter.

POLLACK.—Clark Brothers, of Walkerville, who are operating this property under a lease, have run a tunnel on the ledge from the east end of the claim which is now in 125 feet. A shaft is running which will intercept the tunnel 100 feet farther west, and another shaft has been started to the west and south. Both shafts and tunnel are in good pay, some of the ore assaying high.

TRAVONIA.—Much interest is taken in Butte in the development of this property, recently begun by W. A. Clark, from the fact that it was in this mine that silver-bearing quartz was first discovered in Summit Valley, and shipments to the Newark Refining-Works of the rich chloride ore from the Travonia first attracted the attention of outside capitalists to the camp. In 1875, twenty-five tons of ore from the west shaft were shipped to Newark, which returned over 300 ounces per ton, and in 1877 another shipment was made, which returned 136 ounces of silver and $6 gold. The mine has lain idle for many years until recently. A lot worked at the Colorado smelter recently yielded about the same return. The work at present is principally confined to development and exploration to determine the character and value of the ore-chutes. Very thorough work is done.

NEVADA.

ESMERALDA COUNTY.

COLUMBUS CONSOLIDATED.—All recent work in this mine has been followed by good results. The connection made between the new shaft and the Bonanza winze has proved to be of great advantage to the men working in the winze, as well as to those in the other parts of the mine. When sinking was resumed in this winze, it was down 83 feet. It has now reached a depth of 107 feet. The bottom shows streaks of very rich ore. It is intended to sink 25 or 30 feet farther, and then drift to the east and west on these streaks of ore. The prospect in this winze is very encouraging, and the work of sinking and developing will be diligently prosecuted. The cross-cut has a length of 33 feet, its face being in ground showing broken ledge-matter.

MOUNT DIABLO.

The drift from lower winze No. 2 has developed some ten inches of $40 ore. The stope from this winze shows improvement, and is giving considerable $60 ore. The stopes below the third level, near winze No. 1, are yielding a good deal of $50 ore. The stope above the west drift on the third level is giving some $40 ore from a wide ledge. A little rich ore is extracted from the second level near the center of the mine. The east and west drifts on the second level are giving considerable manganese ore of rather low grade. The intermediate, between the first and second levels, is turning out a good deal of $60 ore. The stope above the west drift from the Callison winze shows a rather stronger ledge in the west end. The center of the ledge shows but little of value, while the east end of the stope is giving some ore of high grade.

EUREKA COUNTY.

EUREKA CONSOLIDATED.—The recent development on the 1200-foot level has gradually improved. Other parts of the mine, all worked through the old shaft, have also brightened materially. The developments in the K. K. ground also continue with the most cheering results.

STOREY COUNTY—COMSTOCK LODE.

There is nothing of importance to report from the various mines. Work goes on as usual. The low water in the Carson River, however, prevents the mills from running to their full capacity. Mr. J. W. Mackey has recently been in Virginia City, and visited the Union Consolidated and adjacent mines. In an interview, he stated that he found the north end mines greatly improved.

NEW MEXICO.

GRANT COUNTY.

Until recently, very little has been heard of the Steeple Rock District, which is in the western part of Grant County, bordering on the Arizona line. The mineral belt is about two miles in width, the veins being true fissures, cutting the formation for miles in extent. The formation is principally porphyry, the ore being found in the quartzite ledges. The ore-body, of course, varies in width, but in some places where opened up has been found to be thirty feet wide, carrying principally gold, but also running well in silver.

LINCOLN COUNTY.

RITA.—The mine has about forty feet of development. A clean-up was lately made at Professor Glass's stamp-mill, from a run of eighteen tons of the Rita ore, which resulted in a nugget of gold weighing thirty-one ounces, valued at $20 per ounce, or $620.

SOCORRO COUNTY.

The product of the smelting-works at Socorro for the past month amounts to 10,000 bars of bullion. A third stack is building, when the monthly product will be $75,000 in bullion.

NORTH CAROLINA.

It is reported that the copper mines at Ducktown have been purchased by an English company from Williams & Black, of New York, for $600,000. The mines failed a few years since for $3,000,000. They are the most extensive in the South.

UTAH.

BOX ELDER COUNTY.

TRUE FISSURE.—The mine is producing regularly. A shipment made demonstrates that the ore is getting richer and better as depth is gained.

SALT LAKE COUNTY.

GERMANIA.—The smelter began shipping August 3d, and up to September 10th shipped fifty-six cars of bullion, 1,357,955 pounds, valued at $129,006.95. The white-lead product has been an average of one car per week of the value of $1500, and lead pipe the same amount, the product having been regular since June 1st.

UTAH COUNTY.

The mining outlook in the American Fork Cañon is very promising, although it must be admitted that the camp is rather slow in showing up, says a correspondent of the Salt Lake *Tribune*.

The Live Yankee has a very large body of good ore in sight, but is working a small force.

The Silver Bell is working a force of ten men. A tunnel is driving to strike the ledge. The mine is shipping no ore, and probably will not ship any until the tunnel strikes the lower levels, where there is an abundance of ore in sight.

In the Silver Lake District, the Milk Maid is working 16 men, and ships from ten to fifteen tons of ore per week.

West of this property are the Good Hope and Olney mines, both in granite formation, and with shafts from 70 to 80 feet deep. These mines show fine ledges of quartz, assaying from 30 to 40 ounces in silver, from $3 to $10 in gold, and a very small percentage of lead. The gold quartz formation in the ledges of those mines is from one to three feet wide, and appears to grow richer as depth is attained.

WISCONSIN.

The discovery of a large bed of iron ore in the northern part of the State is reported.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED SEPTEMBER 4TH, 1883.

284,177. Process of and Apparatus for Desulphurizing Ores. William Frank Browne, New York City.
284,178. Method of and Apparatus for Desulphurizing Ores. William Frank Browne, New York City.
284,181. Furnace. Gottlieb F. Burkhardt, Boston, Mass.
284,233. Process of Dephosphorizing Iron in an Open-Hearth Furnace. Jacob Reese, Alleghany, Pa.
284,246. Bagasse-Furnace. John C. Semones, Minden, Neb.
284,287. Crucible, Muffle, etc. Thomas Egleston, New York City.
284,293. Amalgamating-Pan. Charles Gracey, Contention, Ariz.
284,383. Manufacture of Iron in Blast-Furnaces. Charles Cochrane, Stourbridge, County of Worcester, England.
284,384. Furnace for Reducing Ores. Victor Colliau, Detroit, Mich., Assignor to the Colliau Furnace Company, same place.
284,392. Amalgamator. Joseph C. Dane and William L. Card, La Crosse, Wis.
284,401. Ore-Separating Machine. Orison L. Farnham, St. Johnsbury, Vt., Assignor to John H. Paddock, same place.
284,458. Gas-Retort Furnace. George A. McIlhenny, Washington, D. C.
284,502. Plastic Refractory Material for Repairing Ingot-Molds. Thomas Smith, Alliance, O.
284,550. Process of Annealing Cast-Steel or Iron. James Henderson, Bellefonte, Pa.
284,551. Process of Purifying Solid Iron, producing therefrom Malleable Iron or Steel without Fusion. James Henderson, Bellefonte, Pa.
284,552. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,553. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,554. Basic Process of Manufacturing Iron and Steel. James Henderson, Bellefonte, Pa.
284,560. Coal-Mining Machine. Richard Johnson, Belleville, Ill.
284,574. Basic Process for the Manufacture of Homogeneous Ingot Iron and Steel. Jacob Reese, Pittsburg, Pa.

GRANTED SEPTEMBER 11TH.

284,589. Purification of Mineral Oils. Alexandre André, Fils, Paris, France.
284,611. Rock Pulverizer. Francis M. Case and Willis Case, Denver, Colo.
284,613. Machine for Separating Stones from Clay. Harvey Cockell, Chicago, Ill., Assignor to Richard S. Reynolds, same place.
284,652. Furnace and Hollow Grate-Bar. Otis B. Morse, Great Falls, N. H.
284,691. Dumping-Car. Matthew Van Wormer, Melrose, Mass.
284,693. Cupel Mold. Henry W. Walker, San Francisco, Cal.
284,700. Rolling-Mill. S. T. Williams, Troy, N. Y., Assignor of one half to Robert W. Hunt, same place.
284,799. Hand-Drill. D. Fletcher Barber, Newton, Assignor of one half to Albert M. Gardner, Boston, Mass.
284,830. Furnace-Protector. David R. Fraser, Chicago, Ill.
284,850. Boring-Machine. Theodore Hofstatter, Jr., New York City.
284,865. Miner's Lamp. Charles A. Lee, Arlington, Tex.
284,895. Apparatus Employed in Sinking Pits or Shafts. Ildephonse Quinet and Arthur Denis, Denain, France.
284,946. Combined Pulverizer and Grader. William Commeans, Lilly Chapel, O.
284,949. Brick Machine. Jonathan Creager, Cincinnati, O.
284,950. Metallic Coal-Oil Barrel. James W. Cuthbertson, Bothwell, Ontario, Can.
284,967. Drill-Rest. Henry C. Laubach, Philadelphia, Pa., Assignor to Edward L. Bartlett, Baltimore, Md.
284,992. Reverberatory Smelting-Furnace. Riley P. Wilson, Cleveland, O.

GRANTED SEPTEMBER 18TH.

285,040. Furnace-Grate. William Kearney, Belleville, N. J.
285,098. Concentrator. David H. Anderson, Butte City, Mont., Assignor of one half to William H. Young and Hezekiah Rondebash, both of same place.
285,110. Ore-Concentrator. William F. Carter and John M. Adams, San Francisco, Cal.
285,111. Dry Gold-Separator. Salathiel C. Chaney, Chico, Cal.
285,113. Continuous Rolling-Mill. George W. Corbett and John E. Cunningham, Chartiers Township, Alleghany County, Pa.
285,232. Ore-Concentrator. Alexander D. Clarke, New York City.
285,297. Air-Compressor. Charles Moore, Philadelphia, Pa.
285,307. Ore-Washer. John G. Roberts, Idaho Springs, Colo.

GRANTED, SEPTEMBER 25TH.

285,387. Power-Hammer. John C. Butterfield, Chicago, Ill.
285,388. Stamp-Mill. John C. Butterfield, Chicago, Ill.
285,389. Atmospheric Hammer. John C. Butterfield, Chicago, Ill.
285,390. Atmospheric Hammer. John C. Butterfield, Chicago, Ill.
285,391. Mortar for Stamp-Mills. John C. Butterfield, Chicago, Ill.
285,431. Utilizing Phosphorus and Steel Scrap in the Basic Process. Jacob Reese, Pittsburg, Pa.
285,508. Amalgamating Ores and Sands containing Gold. Almarin B. Paul, San Francisco, Cal.
285,516. Rock-Drill. Alfred Shedlock, Brooklyn, N. Y.
285,522. Regenerative Furnace. William Swindell, Pittsburg, Pa.
285,523. Apparatus for Washing and Separating Gold and Silver from their Ores. William J. Tanner, London, County of Middlesex, England.
285,538. Ore-Crusher. Frank Wheeler and William W. Wheeler, Meriden, Conn.
285,565. Method of Excavating and Apparatus therefor. Frederick Brotherhood, Charleston, S. C.
285,615. Incrustation-Preventive. James B. Hannay, Glasgow, County of Lanark, Scotland.
285,627. Rotating Furnace. J. Burrows Hyde, New York City.
285,628. Apparatus for Boring Rocks under Water. Joseph T. Jones and Joseph H. Wild, Leeds, County of York, England.
285,629. Ratchet-Drill. Robert K. Jones, Liverpool, County of Lancaster, England.
285,638. Process of Producing Babbitt Metal. Amos C. Mann, St. Louis, Assignor of one fourth to Franz Krein, same place.
285,664. Conveyer. Frank L. Pearce, Chicago, Ill., Assignor to the Link Belt Machinery Company, same place.
285,718. Helve or Power-Hammers. Charles W. Willard, Chicago, Ill.
285,726. Drilling-Machine. William F. Barnes and John Barnes, Rockford, Ill.
285,733. Rat-het-Drill. Cemer Thomas Colebrook, Islington, County of Middlesex, England, Assignor to himself and Joshua Rose, New York City.
285,743. Air-Compressor. William T. Fox, Rochester, N. Y.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 19.

There is no change of interest to report in the mining market this week. Business is still confined to a few fancy stocks, and the transactions outside of these are very limited. Harlem was the most active stock in the market and was a little stronger. A few of the Tuscarora stocks exhibited a little strength, especially Navajo, which sold at very strong prices to-day. The general tone of the market was steady. A full summary is given below. The total number of shares sold aggregates 152,376, as against 193,710 last week.

The Comstock shares have been moderately dealt in at steady prices. California was quiet and steady, selling from 17@20@18c. Consolidated Virginia was strong, under a small business, selling from 45@56c. Sierra Nevada was also strong; it sold from $4@$4.30. Union Consolidated was quiet and steady at $3.90. Mexican was moderately dealt in at steady prices; it sold from $3.40@$3.75, assessment paid, and from $2.45@$2.25 assessment unpaid. Ophir was strong, with a small business; it sold from $5@$6.25. Hale & Norcross was fairly dealt in and was quite weak; it sold from $2.75@$1.10. Savage sold at $1.10. Yellow Jacket at $3.50, and Best & Belcher at $3. Sutro Tunnel was active and irregular, selling from 16@18@17c.

The Leadville stocks were very quiet at about steady prices. Amie was irregular, under a very active business, selling from 13@9@11c. Chrysolite was quiet and a little weak, selling from $1.20@$1.10. Dunkin was steady at 25@28c. Iron Silver was quiet and steady, selling from $3.15@$3. Leadville sold at 40c., under a small business. Little Chief was moderately dealt in at steady prices; it sold from 60@57c. Little Pittsburg was also steady, under a small business, selling from 62@65@64c. Climax sold from 9@8c.

The Bodie stocks were quiet and steady. Bodie Consolidated was quite strong, with a small business, selling from 59@70c. Standard was quiet and irregular, selling from $6.25@$5.63@$5.75. Consolidated Pacific sold at 45c., and North Standard at 16c.

The Tuscarora stocks were moderately dealt in at strong prices. Grand Prize sold at 47c. Belle Isle was quiet and weak, declining from 50@41c. Navajo was very strong, under a moderate business; it sold from $3.60@$4.60. North Belle Isle was also strong, with a small business, selling from 50@64c. Elko Consolidated was very active at irregular prices: it sold from 2@4c.

In the miscellaneous list, Alice was quiet and steady, selling from $2.65@$2.75. Eureka Consolidated was moderately dealt in at irregular prices; it sold from $5.63@$6.25@$5.50. Horn-Silver was fairly dealt in at steady prices, selling from $6.63@$7. Robinson Consolidated was very irregular under a moderate business; it sold from 36@45@40c. Sierra Grande was quiet and steady at $1.05.

Barcelona was moderately active at irregular prices, selling from 25@30c. Decatur was quiet and steady, selling from 4@3c. Eastern Oregon was fairly active at irregular prices; it sold from 48@41@42c. Harlem continues to be very actively dealt in, and has been quite strong; it sold from 86@93c. Silver Cliff sold from 10@8c. under a small business. Sonora Consolidated was very active at steady prices; it sold from 22@25@24c.

The Homestake Company has reduced its monthly dividends from $50,000 to $25,000.

The Ontario Mining Company, which is at the head of the list as a dividend-paying property, has resumed the payment of dividends, and the one just declared makes a total of $5,000,000 paid to its stockholders since the mine was placed on a dividend-paying basis.

A dividend of twenty cents a share has been declared by the Father de Smet Mining Company. This is the first since last July.

MEETINGS.

The Carbonate Hill Mining Company, No. 115 Broadway, New York City. Annual meeting of stockholders and election of trustees, November 8th, at one o'clock P.M.

The Empire Copper Company, office of M. H. Hoffmann, Room 7, No. 629 Walnut street, Philadelphia. A special meeting of stockholders, for the purpose of authorizing a sale of the pine timber on a part of the company's lands in Keweenaw County, Michigan, November 10th, at one o'clock P.M.

The Resolute Mining Company, office of M. H. Hoffmann, Room 7, No. 629 Walnut street, Philadelphia. Special meeting of stockholders for the purpose of authorizing a sale of a part of the company's lands in Keweenaw County, Michigan, November 10th, at twelve o'clock M.

The Spring Creek & Rockerville Water and Mining Company, office of T. J. Temple, No. 155 Broadway, New York City. Annual meeting of stockholders, November 14th, at three o'clock P.M.

DIVIDENDS.

The Crescent Mining Company, of Utah, has declared dividend No. 4, of $30,000, payable at Salt Lake City, October 31st. The total dividends to date are $150,000.

The Father de Smet Mining Company, of Dakota, has declared a dividend of twenty cents per share, payable October 31st, at the office of Laidlaw & Co., No. 14 Wall street.

The Homestake Gold Mining Company, of Dakota, announces its regular dividend of $25,000 for September, making a total thus far of $2,237,500. The present dividend is payable at the office of Lounsbery & Haggin, transfer-agents, Mills Building, No. 15 Broad street, on October 25th.

The Ontario Silver Mining Company, of Utah, has resumed its regular dividends, and the eighty-eighth, amounting to $75,000, will be paid by Messrs. Lounsbery & Haggin, transfer-agents, at their office, Mills Building, No. 15 Broad street, on October 31st. The above dividend makes a round total of $5,000,000 paid to date.

PIPE LINE CERTIFICATES.

Watson & Gibson, petroleum brokers, No. 49 Broadway, report that the petroleum market during the past week has been dull and featureless.

The flurry in Wall street and decline in prices of meats and breadstuffs in Chicago would naturally have exercised a depressing influence on the petroleum market. That oil has held so steady and firm is evidence that the leading bulls are supporting the market. The news during the week has encouraged the bulls, as Howe No. 11 and Balltown No. 14, were of no value as producers, and reports were circulated that Bradford and Allegheny fields were declining in production. The "runs," so far this month, are about 10,000 barrels daily less than the shipments, and charters continue large. The petroleum market is so stagnant that the public are not inclined to load up, and until the temper of general speculation changes, we do not anticipate any bull movement of importance.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 13	$1.10¾	$1.11⅞	$1.10	$1.10¼	4,748,000
15	1.10⅜	1.11⅜	1.10⅛	1.11	3,380,000
16	1.11⅜	1.1 ⅞	1.10⅛	1.10¼	4,175,000
17	1.10¼	1.10¾	1.09⅝	1.10	4,023,000
18	1.09⅜	1.11	1.09⅝	1.10⅝	2,577,000
19	1.10⅞	1.11¼	1.09¼	1.09⅛	2,816,000
Total sales					21,719,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 18.

There is but little to be said regarding the market for mining stocks the past week. There is but very little doing, either in coppers or silvers, and prices have had a downward tendency. Calumet & Hecla is now selling at $239½, ex dividend $5 per share, which is a decline of $1¼. Quincy declined from $51 to $50 on small sales. Pewabic declined from $1½ to $1¼, with late sales at $1⅛. An assessment of $1 per share has been levied upon this stock, payable on the 23d inst. Osceola sold same as last week at $19. Franklin sold at $12⅞ for a small lot. The rest of the copper list is totally neglected. The whole amount of sales for the week is less than 600 shares, and fully reflects the entire want of activity in the market.

The silver stocks are without any special feature. Catalpa declined from 32½c. to 30c. Sullivan steady at 87½c. Silver Islet sold at $3. San Pedro sold at 15c.

At the Mining Stock Exchange, business continues to rule dull, and, with the exception of Empire prices are lower. Empire is in fair demand, and but little stock offering. Sales were made yesterday at 24@25c.; to-day, 26c. is bid without bringing out any stock. Bowman Silver is dull and no disposition to trade in it; price rules at 12@13c. Massachusetts & New Mexico has almost faded out of sight; occasional sales at 3@4c. In Sullivan, there is more doing than at the old Board, and better prices are obtained. Sales at 87½@92½c. regular, and 97½, buyer 60 days.

3 P.M.—At the afternoon Boards, Empire sold at 28c.; closing 27c. bid. Sullivan steady at 92½@90c., seller 30. Franklin sold at $12. Quincy offered at 50c. Remainder of market unchanged.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 12.	Oct. 13.	Oct. 15.	Oct. 16.	Oct. 17.	Oct. 18.
Albion						
Alpha		2⅛	2⅛	2		2
Alta	1⅜	1½	1¼	1½	1½	1½
Argenta	.15	.25	.25		.40	.20
Bechtel						
Belcher	1¼	1⅜		1⅜	1⅜	1¼
Belle Isle	.35		.40	.40	.50	.50
Best & Belcher	3¼	3¼	3⅛	3¼	3¾	3⅛
Bodie	.50	.55	.60	.70	.70	.65
Bullion						
Bulwer						
California	.20	.25	.20	.20	.20	.15
Challar	2¾	2¼	2⅜	2¾	2⅜	2½
Con. Virginia	.50	.50	.55	.55	.55	55
Crown Point	1¼	1¼	1¼	1¼	1⅜	1¼
Elko Cons						
Eureka Cons			5	4½	4¾	4¾
Exchequer						
Gould & Curry	2¼	2¼	2¼	2⅛	2⅛	2¼
Grand Prize	.50	.50	.50	.53	.55	.55
Hale & Norcross	3⅛	2½	2½	2½	2⅞	2⅝
Independence						
Martin White						
Mexican	2⅜	2⅜	2½	2⅜	2½	2⅜
Mono						
Mount Diablo	4¼		4			
Navajo	3¼	3½	3¾	4	4½	4⅝
Northern Belle	5					
North Belle Isle						
Ophir	4¾	6⅛	6½	5¾	5⅞	5¾
Overman						
Potosi	1	1	1	1	1	1
Savage	1¼	1⅛	1¼	1⅛	1¼	1⅛
Scorpion	.60		.60	.60	.60	.55
Sierra Nevada	4¼	4¼	4⅜	4⅜	4½	4¼
Silver King						
Tip Top						
Union Cons	3¾	3⅞	4	4	4½	4
Utah	1⅞	2	2	1⅞	2⅜	1⅞
Wales Cons						
Yellow Jacket	3⅛	3¾	3½	3⅜		3½

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 19.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Oct. 13	50⅞	110½	Oct. 17	51	110¾
15	50⅝	110½	18	51	110¾
16	50 15-16	110⅝	19	51	110¾

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 19th, as compiled from various sources, amounted to $218,000, as against $296,000, reported for the previous week. The receipts from January 1st, 1883, to date are $9,163,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 13th	$272,158
Corresponding week last year	25,700
Since January 1st, 1883	11,550,234
Corresponding period last year	44,327,495

Imports.

Week ended October 13th	$7,022
Corresponding week last year	434,827
Since January 1st, 1883	12,913,242
Corresponding period last year	3,803,812

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £311,000 bullion, and the proportion of its reserve to its liabilities was raised from 42¼ to 43¾ per cent, against 35 11-16 per cent at this date a year ago. October 18th, the bank lost £30,000 bullion on balance. The weekly statement of the Bank of France shows losses of 350,000 francs gold and 360,000 francs silver. The statement of

the Imperial Bank of Germany shows a loss of specie amounting to 2,260,000 marks.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of September.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		$381,587
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"		12,604
Bodie, G. S.	Cal	15,659	189,660
Bodie Tunnel, G.	"		52,742
*Bonanza King, G.	"		426,967
*Boston & Montana, G.	Mont		128,830
*Central Arizona, S.	Ariz		35,845
*Christy, S.	Utah	20,981	201,715
*Chrysolite, S. L.	Colo	27,183	311,491
*Consolidated Bobtail, G.	Colo		47,986
*Contention, S.	Ariz	79,224	714,637
Crescent, G.	Cal		13,000
*Custer, G. S.	Idaho		43,572
*Deadwood-Terra, G.	Dak	51,960	335,540
*Derbec Blue Gravel, G. S.	Cal	14,097	102,579
Dunkin, S. L.	Colo	6,113	42,959
Evening Star, S. L.	Colo		47,061
*Father de Smet, G.	Dak	32,286	270,876
*Frisco M. and S. Co., G. S. L.	Utah		§77,084
*Granite Mountain, S.	Mont	63,834	165,950
Gunnell, S.	Colo		58,828
*Haile, G., S., C.	S. C.		27,900
*Head Center Consolidated	Ariz		32,618
*Head Center and Tranquillity	Ariz.		89,108
*Hecla Consolidated, G. S. L.	Mont	*77,630	633,979
*Homestake, G.	Dak	81,624	767,596
*Hope, S.	Mont	19,613	82,060
Horn-Silver, S. L.	Utah	303,000	2,474,200
*Howell S. and Mg. Co., G. S. L.	Ariz	23,760	114,289
Idaho, G.	Cal		150,642
*Independence, G. S.	Nev		32,991
Iron Silver, S. L.	Colo		751,062
*Jocuistita, S.	Mex		‡258,959
*Kentuck, G. S.	Nev		16,866
*Lexington, S.	Mont	111,005	967,708
*Little Pittsburg, S. L.	Colo	10,473	64,978
*Marguerite, G.	Cal	3,200	68,794
*Martin White, G. S.	Nev		136,317
Morning Star, S. D.	Colo		84,428
*Moulton, G. S.	Mont		123,288
Mount Diablo	Nev	51,709	281,142
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S.	"	30,840	505,827
*Ontario, S. L.	Utah	185,834	1,595,378
*Oxford, G.	N. S.	4,910	50,175
*Phœnix, G.	N. C.	3,500	21,009
*Pinal Consolidated, S. L.	Ariz		181,485
*Plymouth Consolidated, G.	Cal	68,864	296,082
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont		203,947
*Silver Cord, G. S. L.	Colo		703,333
Silver King, S.	Ariz		367,802
Standard, G.	Cal	95,878	875,222
Star, S.	Nev		27,095
*Stormont, S.	Utah	17,686	193,791
Syndicate, G.	Cal	9,623	56,008
Tintic M. and M. Co.	Utah	5,554	34,670
*Tip Top, S.	Ariz		57,868
*Tombstone, G. S. L.	"		548,764
Wyoming Consolidated.	Cal		31,541
Yellow Jacket, S.	Nev		265,885
Total amount of shipments to date			$17,641,331

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Oct. 19.

Copper.—The lake companies have made an arrangement with the leading companies to extend the contracts about to expire to the end of the year, the price to remain the same, 15c., and the quantity involved being, it is stated, eight millions of pounds. In other kinds, little has been done, Baltimore selling in a small way at 14¾c. We quote for Lake 15¼@15½c.; and for other kinds, 14¼@14¾c., according to brand. England has again receded, being cabled to-day £60 15s. for Chili Bars. It appears to be becoming a question who will survive in a struggle in the markets of the world, our silver-bearing copper material and high-grade copper from oxidized ores, or the crude copper of Chili. The balance is strongly in our favor, but the time before Chili producers fall off may be a long one.

The trade will learn with sorrow of the sudden death, yesterday afternoon, of Mr. Nathaniel S. Simpkins, Jr., who has been identified with the Calumet & Hecla Company since its inception. His brother, Mr. John Simpkins, was president of the Huron Company when the agent of that company, in building a road, uncovered the Calumet & Hecla conglomerate. The two brothers, with Captain Frue, became interested in the property. They engaged Captain Hardy, of the Quincy, to open out the mine, his successor being Professor Agassiz, who had acted as manager of the Boston & Albany. On the death of his elder brother, who managed the affairs of the company in the East, N. S. Simpkins, Jr., in 1870 took charge, and for many years practically controlled the copper market.

Messrs. James & Shakspeare, of London, have issued the following statistics of copper in England and France, including metal afloat:

		——Sept. 1 to 30.—— Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian		802	880	London.
Chili	Bars	2,629	808	Liverpool and Swansea.
	Ingots	340	255	
	In ores and regulus	307	5	
American		729	770	
Spanish precipitate and sundries		4,026	4,145	
Totals, England		8.833	6,963	
American		525	575	France.
Chili bars, ingots, and Barilla		1,535	1,660	
Sundries		95	95	
Total, England and France		10,988	9,293	

	——Stocks.—— Sept. 29. Tons.	Aug. 31. Tons.	
Fine foreign, chiefly Australian	3,900	4,078	London.
Chili Bars	25,155	23,334	Liverpool and Swansea.
Chili Ingots	536	451	
Chili In ores and regulus	2,115	1,813	
American	97	138	
Spanish precipitates and sundries	4,338	4,457	
Totals, England	36,141	34,271	
American	340	390	France.
Chili bars, ingots, and Barilla	1,922	2,047	
Sundries	30	30	
Total, England and France	38,433	36,738	
Advised by mail and telegram:			
Chili	10,200	11,209	
Australian	900	900	
Stock and afloat, gross totals	49,533	48,845	

	——Jan. 1 to Sept. 30.—— 1883. Tons.	1882. Tons.	1881. Tons.
Imports	71,409	58,458	57,709
Deliveries	68,103	62,606	61,403

The last figures are significant. They show an enormous increase in the imports thus far.

Tin.—The market is quiet, with an undercurrent of weakness. For Spot Straits 20⅝c. is asked. We note a sale of 200 tons, delivery after January, at 20⅝c. London cables £93 7s. 6d.@£93 10s.

Lead.—Under sales in small parcels aggregating 500 tons of Common and Refined, the market has receded from 4·20 to 4⅛c., with Refined at 4·15c. More is offered at these figures, but there are no buyers, the latter maintaining an attitude of reserve. The short season will soon be over, and a falling off in the demand from that quarter is looked forward to. Should the winter prove an open one, the pipe trade will continue brisk; if not, there will be a contraction of the supplies needed for that purpose. It is reported that desilverizers are making very favorable terms with smelters, the offerings of base bullion being very large.

Messrs. John Wahl & Co., St. Louis, wire us as follows to-day:

Sales during the week aggregate 250 tons of Refined at 3·90c., delivered at buyers' works; 400 tons November delivery, at the same figure; and 300 tons of ordinary Missouri to Eastern consumers at 3·80c. Our market closes firm at 3·90 for spot Refined, on account of the railroad switchmen's strike here.

Messrs. Everett & Post, of Chicago, telegraph to-day:

In our market, sales of Refined and Common have been more freely made since our last, and several hundred tons have been placed at 3·90c., 3·92½, and 3·95c. Our market is now heavier, flat, and weak, buyers, as they expect a decline, holding off, and making their purchases only for immediate delivery.

Spelter.—This metal has relapsed into dullness, and is weaker, ordinary Western being procurable under 4½c. European advices are higher.

Sheet-Zinc is very low, selling here for 5⅝@5¾c. in jobbing lots, in spite of the fact that the card rate in the West is 6c., less 11 per cent for cash.

Antimony.—Antimony is a little firmer, at 10¼c. for Cookson's, and 9c. for Hallett's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 19.

American Pig.—The event of the week has been a further reduction by the Thomas Iron Company of its prices of foundry iron, to $20.50 for No. 1 and $19.50 for No. 2, at which figures sales of about 1000 tons were made in the beginning of the week, with no further business during the past two days. We quote $20.50@$21.50 for No. 1 and $19@$20 for No. 2, with mill irons, which are a little more active, at $17.50@$19 at tide. Bessemer pig is dull, foreign being freely offered at $20.50 at tide. Spiegeleisen is quiet at $30@$30.50.

At the Exchange, the following sales were recorded:

Monday, 200 tons American Pig, No. 1, January, $20. Wednesday, 500 tons American Pig, No. 1, Janary, $20; 300 tons No. 1, February, $20¼.

Scotch Pig.—The market continues dull and lifeless, though there is no exceptional cutting. Arrivals are light, aggregating 1200 tons.

We quote ex ship and to arrive: Coltness, $23.25; Langloan, $23.25; Summerlee, $22.50@$23; Eglinton, $21; Glengarnock, $22@$22.50; Dalmellington, $21.

At the Exchange, the following lower cable quotations were received to-day: Coltness, 57s.; Langloan, 56s. 9d.; Summerlee, 55s. 6d.; Gartsherrie, 54s. 3d.; Glengarnock, at Ardrossan, 53s. 3d.; and Eglinton, at Ardrossan, 47s. 6d. Warrants at the Exchange to-day were 51s. 7d.

Rails.—A part of the contracts alluded to last week were 16,000 tons Edgar Thomson and Homestead, at $36.50, delivered at Pittsburg. It is stated that since then a lot of 4000 tons has sold at $34.25 at mill, though the report is discredited. We quote $36.50@$37 at mill.

Old Rails.—There is very little doing, the demand being slack. Sales of Ts have been made as low as $21. We quote $21@$22.

Scrap is dull at $22.50@$23 ex ship.

Philadelphia. October 19.

Erroneous and unjustifiable reports have been circulated concerning the condition of the Pennsylvania iron trade. Very few furnaces have gone out of blast recently, although it is true that several companies contemplate blowing out shortly, partly on account of low prices, and partly in order to make repairs when the market is dull and stocks large. Foundry irons continue dull and weak, and the efforts made to move them at concessions have not resulted in sales of more than ordinary lots. The production of foundry iron will probably fall off, as stocks are large, and buyers are not disposed to cover requirements for the future. Prices range from $19@$22. A number of transactions have taken place at $21 for No. 1 and $19.50 for No. 2; some No. 1 has sold at $21.50 and a little at $22. The tone of the forge iron market is somewhat better, and the stronger companies decline to follow the downward tendency, confident that the market will take care of itself.

Foreign Iron.—Bessemer is offered at $20.50, but bids have been withdrawn, and buyers are not urgent just now. Spiegeleisen is in more active request at $30@$31. A few hundred tons of Scotch iron have been ordered.

Muck Bars.—A few hundred tons have been sold at $33 50@$34. Demand is active.

Blooms.—Quotations are given at $58 for Charcoal, and $47@$48.50 for Anthracite.

Merchant Iron.—Card rates have been changed from 2·30@2·20c., but very little iron sells above 2·10c.; 2c. is all that can be had for most of the iron moving. Some country mills have sold Refined iron under 2c., and the tendency is downward. It is announced that two or three mills will come to single turn next week. Western iron has been shipped into Eastern Pennsylvania, and interferes with trade.

Nails.—Trade price, $2.90; jobbing price, $3; in-

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Oct. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.					2.65				2.75				400
Amie Con., Co.	.13	.12	.13	.12	.12		.12	.11	.12	.09	.11		15,400
Argenta, Ne.													
Bar. & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.									.50	.45	.41		500
Bodie Cons., Ca.							.50		.70				400
Breese, Co.	.19												600
Bulwer, Ca.													
California, Ne.	.19	.17	.20						.18				2,525
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.											.07		300
Chrysolite, Co.	1.20	1.15	1.20	1.15					1.15	1.10			2,100
Cons. Va. Ne.			.48	.45	.50		.52	.50	.52		.56	.55	2,620
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.	.25										.28		1,100
Eureka Cons., Ne.	5.63		6.25		6.00		5.50						500
Excelsior, Ca.													
Father de Smet, Dk.							3.80	3.75					500
Findley, Ga.													
Gold Stripe, Ca.							.05						300
Gould & Curry, Ne.													
Grand Prize, Ne.			.47										30
Great Eastern, Dk.	.26												
Green Mountain, Ca.													
Hale & Norcross, Ne.			2.75				1.15	1.10	1.15	1.10			850
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	7.00		7.00		7.00		7.00	6.75	6.88	6.63	7.00	6.75	2,515
Iliukill, Co.													1,550
Independence, Ne.													
Iron Silver, Co.							3.15	3.00					1,010
La Plata, Co.													
Leadville C., Co.			.40										100
Little Chief, Co.	.60								.60	.59	.57	.52	1,750
Little Pittsburg, Co.	.62		.65				.65				.64		800
Martin White, Ne.	.25												323
Moose, Co.													
Navajo, Ne.	3.60		3.75	3.60	4.00		4.00				4.60	4.25	1,850
Northern Belle, Ne.							4.50				4.25		225
North Belle Isle, Ne.	.50				.52	.50	.53		.60		.64	.57	1,900
Ontario, Ut.					23.00								3
Ophir, Ne.	5.00		5.50		6.25								200
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.	6.25												100
Rising Sun, Ca.													
Robinson Cons., Co.	.39	.36	.39	.38	.45	.39	.43	.42	.41		.40		9,350
Saint Joseph's Lead.													
Savage, Ne.					1.10								100
Sierra Grande, N. M.									1.05		1.05		700
Sierra Nevada, Ne.			4.00		4.20		4.30						205
Silver King, Ar.							6.63						25
Spring Valley, Ca.													
Standard, Ca.	5.88	5.75	6.25		5.88		5.88	5.75			5.75	5.63	1,010
Stormont, Ut.													
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket			3.50										50

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales
	Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Oct. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion.													
Alta.													
Am. King, s.													
Barcelona, G.					.25		.26	.25	.27	.26	.30	.28	8,900
Bear Creek													
Bechtel Con., G.													
Belvidere													
best & B'icher, G. s.											3.00		40
Big Pittsburg, S. L.													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S. L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., B. H., G.													
Central Ariz'na, S.													
Cherokee, G.													
Chollar													
Climax, Co.					.09						.08		600
Cons. Imp'ri'l, G. S.													
Cons. Pacific.												.45	200
Crowell, G.													
Dahlonega, G.													
Decatur					.04	.03			.04	.03			3,200
Dunderberg													
Durango, G.													
Eastern Oregon	.48	.47	.48						.41		.42	.41	9,300
Elko Cons.	.03		.03		.04	.03	.02		.03		.04	.03	10,400
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	.87	.86	.89	.87	.93	.86	.93	.90	.92	.90	.93	.90	33,200
Hortense, S.													
Imperial													
Lacrosse, G.			.06										100
Lucerne													
Mariposa Prei., G.													
" Com., G.													
Mexican, G. S.	3.45	3.40	3.75		2.45		2.25						675
Miner Boy													
Mono													
North Standard, G.					.16						.16		200
N. Horn-Silv'r, S. L.													
Ori'nt'l & Miller, S.	.07												200
Parnell													
Quartz Creek.													
Rappahannock, G.			.08										1,800
Red Elephant, S.													
Ruby, of Arizona													
Silver Cliff, S.											.10	.08	900
Sonora Con.	.22		.22		.24	.22	.25	.24	.25		.25	.24	18,100
South Bodie, G.													
South Bulwer, G.													
South Rifle													
South Pacific.													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.18	.17	.17		.17		.17	.16	.18	.17			13,300
Taylor-Plumas													
Tioga													
Union Cons.	5.90												100

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 50,361. Non-dividend shares sold, 102,015.

BOSTON MINING STOCKS.

	Oct. 12.		Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez.													
Amie											.12		200
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.											1.63		100
Bowman Sil			.13		.13	.12	.13	.12	.12⅛	.12	.12⅛		4,300
Bruns. Ant.													
Bulwer													
California					.13								100
Cal. & Hec.	245		240		240		240	239½			239		28
Catalpa	.30				.30				.28		.30		1,000
Central Ariz													
Cherryfield													
Co. Virginia			.48										200
Copper F'lls													
Crescent													
"Cusi"													
Decatur													
Deer Isle											.04		1,000
Denver City													
Douglas													
Duncan													
Dunkin											.28	.24	6.0
Empire			.18		.21	.18	.23	.20	.25	.24	.28	.27	6,500
Eureka Con.									6.13				25
Franklin	12.88				12.75						12.00		85
Hancock G.													
Harshaw													
Huron													
Indian Q'n.													
Mammoth					.62								1,000
Mass. & N.M.					.04		.01						1,500
Milton													
Napa													
National													
North. Belle			5.13										25
Ontario													
Osceola					19.00		19.00		19.00		19.00	18.50	86
Penn-Breck.													
Pewable	1.25						1.25		1.25		1.38	1.25	405
Pine Tree													
Plymouth									.12				200
Quincy	51.00		51.25	51.00	51.75		51.75		51.00	50.00	50.00		171
Ridge													
Robinson							.39						100
San Pedro	.15		.15		.15		.15						800
Sierre Nev.													
S'ra Grande													
Silver Islet			3.00		3.00		3.00						160
Simpson Gd													
South Pacl.													
Standard													
Sullivan	.81¼				.90		.97½	.90	.92½	.87½	.92½	.90	3,150
Sutro Tun.					.18		.18				.17		700
Twin Lead.													
Vizina													
Sonora			.25						.23				300
Little Pitts.									.65				100
Stewart											.12½		500
Climax											.08		200

PHILADELPHIA MINING STOCKS.

	Oct. 12		Oct. 13.		Oct. 15.		Oct. 16.		Oct. 17.		Oct. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent.	.18		.18		.18								9,300
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati			.09										5,000
Comprom'e.			.13		.13								1,300
Contention													
Con. Virg.													
Dauntless			.02										8,200
Del Monte													
Denver City													
Eureka													
Girard													
Governor	.06												2,000
Grand Uni'n	.03		.03		.03								7,300
Green Mt.													
Gunnison			.16		.15								1,700
Homestake													
Horn Silver													
Iowa Gulch	.04		.04	.03	.04								22,600
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud	.03												1,500
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.					.10								10,500
Permanent			.02										5,000
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis					.12								1,500
Rara Avis E.	.09		.09		.09								7,100
Record													
Rico Pion'r.													
Sierra Apac.	.27½				.27½								1,600
Sierra Be. la.					.70								200
Sierra G'nde	1.02½		1.05		1.05								900
Sierra Nev.													
Silver Cord.													
Silver King.													
Silv'r Flume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l.					.30								100
Tombstone	.87½		.87½	.85									1,700
Victor													
Yale Mt.													

side special rates, $2.85. Several car-load lots have been ordered this week, in view of the probability of great activity in building construction throughout the winter.

Plate and Tank Iron.—No large orders have been booked, but several are in sight, and some specifications have arrived which will result in large business within a week. Boat plate is 2·35c.; Tank, 2·40@2·50c. Shell and Flange are without change.

Structural Shapes.—A few more inquiries for fair-sized lots have arrived, and orders will be placed this week. Quotations are 2·40c. for Angles and 3·50c. for Beams and Channels. Some concessions have been solicited and will be extended when large orders are to be had.

Sheet-Iron.—A large amount of sheet-iron has been ordered this week, and inquiries for thin sheets continue active. Card rates unchanged.

Steel.—Merchant steel is in quite active request, especially for the better makes. Competition is active on the low grades.

Steel Rails.—A fair amount of business was transacted in ordinary lots for delivery in November and December, and it is probable that in a few days some heavy business will be placed for winter delivery. Quotations are $37 $38.

Old Rails.—Quotations are nominally $23.50 for Tees, $24.50 for Bridge rails, and $26 for Double Heads.

Scrap.—Quotations, $20@$25, according to quality. Cargo, nominal, at $23.

Pittsburg. October 18.

To-day's probabilities point to an improving demand for pig-iron, because of the gradual diminution of stocks in local furnaces. Nine furnaces are now in blast, and three out. Lucy furnace No. 2 was blown out last Monday, and will be relined and started on January 1st. Isabella furnace No. 2 has been out for a year. The average production of the home furnaces is about 1600 tons a day. Makers of outside iron are in town, offering iron for future delivery at low prices. Several mills are working single turn, and it is said to-day that two or three others will follow suit. A number of buyers are ready to anticipate requirements as soon as assured that lowest prices have been reached. Very little iron is to be found in mill-yards. Sales of Foundry have been made in 50 to 100-ton lots at $20@$21 for No. 1, and $18@$20 for No. 2, on time. Bessemer, $21@$21.50. Forge, $17.50@$18 in 100 to 500-ton lots. Muck Bars are selling at $33 cash. Manufactured iron is still weak and dull at 1·80@1·90c. The consuming interests are prepared to place large orders to run them until the last of the year, as soon as the supply and demand are more nearly equalized. A week or two will probably develop new features and lead to an improvement. Several lots of iron have been shipped East. Nails are quoted at $2.80@$2.90, and are selling in large lots at $2.70. Large lots of pipes have been sold at 75 per cent off list. Between 10,000 and 15,000 tons of steel rails have been contracted for at $36.50@$37. Sheet-iron is in fair request, and galvanized is moving freely. The steel-mills are working as usual, but manufacturers complain of low prices. Old Rails are quoted at $24.25@$24.50. Spikes, 2·60c. Splice Bars, 1·90c. Track Bolts, $3@$3.25. Crop-Ends, $23.50 for American. Scrap, $20@$22. Car-Axles, $31.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 19.

Anthracite.

The condition of the anthracite coal market is unchanged, no movement whatever, so far as we can learn, having been made to bring about a better condition of affairs. Prices are low, and sales light, so that the excess of coal over that required to fill engagements previously made must be piled up somewhere. The Eastern trade is exceptionally dull, while the river trade, as is usual at this time of the year, is active, the stocking up of the many towns along the Hudson going on now. Some of the dealers of that section are now pretty well supplied, however, and the first ice will divert to this market large quantities of coal. The policy appears now to utilize the time before the closing of navigation, but it may well be questioned whether a considerable quantity of coal will not have to be stored at various points to relieve an excess. The trade of course is disappointed that no effort has been made to protect its interests, and it urged with some force that it is unjust to load dealers up with coal earlier in the season and then allow the price to drop off as it has.

John H. Jones, official accountant, has issued the following statement of anthracite coal tonnage for the month of September, 1883. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Sept., 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,171,187	7,160.876	4,899,125	I. 2,261,751
Central RR. of N. J.	*.....	1,745,399	3,068,630	D. 1,323,231
Lehigh Valley RR.	†606,140	4.568,221	4,237,307	I. 330,914
Del., Lack. & W. RR.	472,933	3,675.135	3,343,633	I. 331,502
Del. & Hud. Canal Co.	‡350,160	2,530,885	2,240,983	I. 289,882
Penna. RR.	273.775	1,989,887	1,747,105	I. 242,781
Pa. Coal Co.	154,129	1,096,595	1.045,970	I. 50,624
N. Y., L. E. & W. RR	47,030	268,542	195,494	I. 73,048
Total	3.084,355	23,035,520	20,778,247	I. 2.257,273

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 7761 tons.

‡ In addition, there were 67,728 tons transported from the mines by the Delaware & Hudson Canal Company, during September, which is included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points, September 29th, 1883, was 538,490 tons; on August 31st, 1883, 576,132 tons; decrease, 37,642 tons.

Bituminous.

The scarcity of cars is the complaint from a number of quarters, but current business is so slack that it has no effect whatever on values.

Horsford's Acid Phosphate

For Overworked Professional Men.

Dr. Charles T. Mitchell, Canandaigua, N. Y., says: "I think it a grand restorer of brain force or nervous energy."

DIVIDENDS.

SAN FRANCISCO, Oct. 16, 1883.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared

DIVIDEND NO. 29,

of twenty cents per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, on the 31st inst.

Transfer-books will close on the 23d inst.

H. DEAS, Secretary.

HOMESTAKE MINING COMPANY, MILLS Building, 15 Broad Street.

NEW YORK, Oct. 15, 1883.

DIVIDEND NO. 62.

The regular monthly dividend of TWENTY (20) CENTS per share has been declared for September, payable at office of Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on 25th inst. Transfer-books close on 20th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

ONTARIO SILVER MINING COMPANY, Mills Building, 15 Broad Street.

NEW YORK, Oct. 15, 1883.

DIVIDEND NO. 88.

The regular monthly dividend of FIFTY CENTS per share has been declared for September, payable at office of Transfer-Agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on 31st inst. Transfer-books close on 25th inst.

LOUNSBERY & HAGGIN, Transfer-Agents.

ROTHWELL'S

Great Map of the Wyoming Valley.

This, the most elaborate and accurate topographical map ever made in this country, outside of the Coast Survey, covers an area of TWO HUNDRED SQUARE MILES, and the work upon it cost over $12,000. It represents a coal-field which produced in 1882 over 13,000,000 tons of Anthracite. The Map was constructed altogether from original surveys. Every Road, Colliery, Building, or land or property line existing at the time is accurately located. The surface configuration is shown by CONTOUR LINES TEN FEET APART, VERTICALLY; and the elevation of every point above sea-level is given

But a small edition of this Map was printed, and the plates were then destroyed.

A few copies are for sale

Price: On thick heavy paper $25

On bond paper, for mounting 25

The six sheets can be mounted separately, or in a single roll 15 feet long by 42 inches wide.

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MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch: 9 miles. 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 26×30 inches. Pocket form, $1.50; as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22 × 27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. $1.50.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53×41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers, $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Tuscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 × 38 inches. Pocket form, stiff paper cover, $1.50; or as a wall map, $1.50.

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